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JAN MAYEN EXPEDITION OF 1911

BY

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The Jan Mayen Expedition of 1911 was organized by J. Foster Stackhouse, F.R.G.S., F.R.S.S. The party under his command consisted of Mrs. Stackhouse and seventeen men. The destination was Jan Mayen; the object, to make a series of meteorological observations between Iceland and Jan Mayen and to survey the coast of the island for data to supplement the work of the Austrian Expedition of 1882-3. Mr. Stackhouse had had in preparation for some time the construction of a relief map of Jan Mayen and he desired to make a personal observation of the coast lines and take some measurements.

The expedition contained a meteorologist, a zoologist, two ornithologists, a geologist, two color photographers, a botanist, a mountain climber, a cartographer, a cinematograph operator and an artist. A suitable vessel had been chartered, but a short time before the party assembled at Newcastle, England, the charter had to be cancelled through a whim of the owner. We were obliged to take what we could find at short notice,—the *Matador*, 232 tons gross register. She was a private steam yacht, a first-class sea boat, but of insufficient bunker capacity for our purpose. The charter gave a coal capacity of 40 tons. By coaling on the east coast of Iceland and carrying a load on deck, we hoped to reach the island and have a few days for work on the coast survey, providing the waters were free from ice.

We sailed from Newcastle at 6 A.M., July 30. The course was laid through the Orkney Islands, and the Faroes to Seydisfjord, Ice-

land, that we might easily reach a coaling station in case of stress of weather, which would prematurely deplete our coal supply. We had on board the Icelandic mail and carried an expedition flag, modelled after that of the Arctic Club of America, with the British Jack in place of the Stars and Stripes. We left the mail at Seydisfjord on Aug. 3, and coaled. We here made the distressing discovery that in place of forty tons, as stated in the charter, our bunkers held only twenty-four tons.

A violent storm on the east coast of Iceland detained us in port two days. During this time the botanist, the ornithologist and the

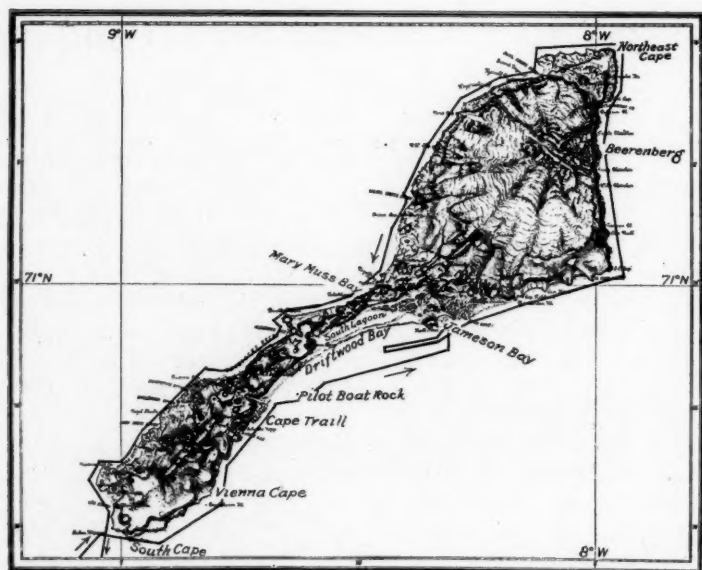


FIG. 1.—Map of Jan Mayen based on the map of the Austrian Expedition of 1882-83. 1:500,000 (1 in. = 7.89 miles). The full line accompanied by arrows indicates the course of the *Matador*, August 11-12, 1911.

geologist explored the valley at the end of the fiord and the mountains on either side. A large amount of good material was collected for the museums represented by the expedition. Among the minerals was an excellent meteorite, which, as far as we knew, was the first one ever reported from Iceland. It is now in the private collection of Baron Axel Klinckowström in Stockholm.

Early on Aug. 5, we put to sea with the storm still raging. During the afternoon the wind continually increased and the sea became so

heavy that we sought the shelter of Langanes, the northeast point of Iceland. Here we were held for 36 hours in the open bay of Eidisvik. During this period the scientists continued their collections and fully explored the peninsula. The most noticeable feature is the driftwood. There were many logs of great size, some of which bore the marks of the ax, but most of them had been torn up by the roots in spring freshets and swept out to sea. They are of the same character as those I afterwards examined in Driftwood Bay, Jan Mayen. This material evidently came from the great Siberian rivers. Carried out to sea with the spring floods, they became embedded in the ice and slowly drifted with the pack ice as did the *Fram* with Dr. Nansen and the Melville-Bryant Cask No. 6, deposited on the ice

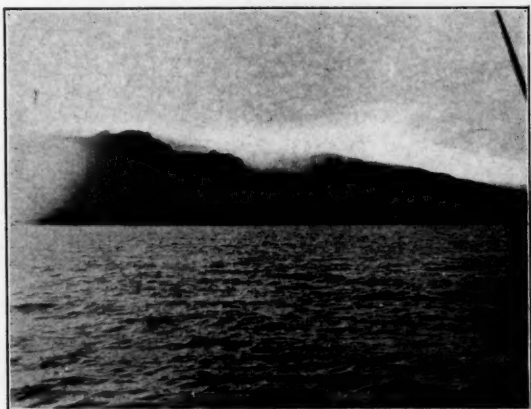


FIG. 2—Entrance to Driftwood Bay. Heavy fog hanging over Beerenberg.

off Point Barrow, Sept. 13, 1899 and picked up by an Iclander at Cape Raudagnupr, northwest of Eidisvik, on June, 1905. All this material must have drifted to the north of Franz Josef Land and Spitzbergen. It then met the more open ice stream that comes down east of Greenland and drifted southward, some of it landing on Jan Mayen and some of it in this bleak bay. The water-worn and ice-scarred timber provides sufficient material for the Icelanders of the north to construct their houses and furnishes an abundant amount of fuel. Much of it is transported into the interior, still more is left upon the shore to decay or again be washed out to sea to find lodgment in the Faroe Islands.

The state of the weather, the condition of the sea and the short-

ened supply of coal seemed to forbid our further progress. We held a consultation, and it was voted to return to one of the eastern fiords, recoal and then; if the sea did not improve, to set south to the Westmann Islands and devote a week to cartographical and geological work. While the coast line of Iceland has been carefully surveyed by the Danes, the Westmann Islands have been neglected and there is opportunity for scientific work there.

A little after midnight on Aug. 8, we entered Faskrudsfjord. We were unable to coal at once as the *Ask* was tied up to the only jetty. The day was, however, profitably spent. Among geologists, Iceland is famed for zeolites. I have collected many fine specimens in the



FIG. 3.—General character of the Jan Mayen coast, rising straight up from the sea. Pilot Boat Rock, the dark pinnacle of rock rising from the sea in the middle of the picture.

interior during a trip of over 1,000 miles, but I have never seen such excellent specimens as I dug out of the bed of a brook which flows down a ravine here, formed by a fault in the lava. We also obtained another specimen very rare in Iceland, of fossilized wood of the Tertiary Period. The specimen was filled with minute zeolites.

We learned by telephone that weather conditions north of Iceland were a little more favorable. With our bunkers full and a good deck load we decided to make one more attempt to reach Jan Mayen. We crossed the Arctic Circle, blew the whistle, and cast overboard a record in a sealed bottle. Hourly observations of air and sea temperatures, the reading of the barometer, direction and velocity of

the wind, compass course and log dial were taken. The velocity of the wind increased and the *Matador* was tossed about so much that we spread all the sail possible to steady the ship. The water temperature steadily decreased but no ice was in sight. Our Icelandic friends warned us that there was much ice in the north waters.

At midday, Aug. 11, a bank of fog loomed in the north. In it somewhere we knew must lie Jan Mayen. A little later we got a glimpse of South Cape and changed our course to bring us just east of the land. Bird life was very abundant and the birds being unacquainted with man flew fearlessly about us and through the rigging. We did not, however, like the French expedition of 1892, "have to push them out of the way to make progress."

When we reached Vienna Cape, the fog lifted so as to give us a view of the summits of the southern craters. The sun shone brightly on Driftwood Bay just ahead and we hoped for a view of Beerenberg. Slowly we steamed close to the shore. A series of photographs was taken to form a full panorama and many sketches and bearings were taken. Everyone was busy.

Reaching Jameson Bay we tried to land but found it impossible on account of the heavy breakers. Turning back to Driftwood Bay we anchored opposite the South Lagoon. It seemed impossible to make a safe landing but Stackhouse, Beetham, Swan and the writer volunteered to make the attempt. We pulled the gig to the edge of the breakers. The sea was running so high that when we were in the trough of the sea we were invisible from the deck of the *Matador*. Slowly we worked southward, past Pilot-Boat Rock to the cliffs near Cape Traill but with no success. This was also the experience of *La Manche* party in 1892. Longingly we examined the heaps of driftwood and thought of the big bonfire we were to make to dry out the fog and spray and efface the chill of the past three days. The ragged lava ridges patched with snow, the gullied mounds of ashes spotted with pale green moss, the abundance of fearless birds flitting between us and the shore, the water courses rushing down from the melting snows, the beautiful sunlight on the beach, the quiet, lonesome beauty of the stately cliffs, the impenetrable fog shrouding the upper peaks, these were the elements of charm on a dreary, lonesome coast, that lured us across the breakers. But prudence forbade. After a long pull we regained the *Matador*. During our absence the guns had been busy and a large number of birds were strewn over the deck awaiting the knives of the taxidermists.

It was 9 P.M. For hours we had cast wistful eyes towards Beerenberg, the most northern volcano in the world, rising 8,000 feet above

the sea. Beerenberg is a rare, a magnificent spectacle. For a few moments the fog opened near the summit, though the middle portion of its glacier-covered slopes was hidden. The sun shone resplendent on the mighty dome of ice, suspended like a truncated cone, apparently in mid air. Then the curtains were swiftly drawn and we were not again to see the wonders of that view from the east. At the same time the fog lifted from the lower and mid-slopes and we saw only the mighty glaciers reaching down from the mist into the pounding surf.

At midnight we rounded Northeast Cape with the sun shining brightly and obtained a momentary view of the summit towards the south but nothing, not even the grandeur of this view, can equal the



FIG. 4—Cape Traill.

splendor of that eastern vision. Slowly we proceeded around the entire coast, hoping to effect a landing at Mary Muss Bay, the home of the Austrian Expedition. The heavy sea prevented. The Austrian station buildings, partly covered with sand, loomed in the mist. We planned to wait a few days here for the sea to subside that we might land some supplies we had taken to leave in the station and report upon the condition of those left by the Austrians twenty-eight years ago. We made a careful estimate of our coal and were dismayed to find that we had a scant supply to reach the Iceland coast. We decided to start at once. The wisdom of this decision was shown some days later when we steamed into Seydisfjörð with only enough coal left to steam two hours. For some time before our departure

we blew our whistle continuously on the chance that there might be some shipwrecked fishermen waiting for a friendly ship to take them back to inhabited lands.

We saw no sea ice of any description around Jan Mayen. The waters were entirely free. Nor was there any ice blink to indicate the presence of ice beyond the horizon. I am unable to find any record of such free water about Jan Mayen as we experienced. Some expeditions have failed to get nearer than thirty miles of the land on account of the ice barrier.

The island is entirely volcanic and of the same formation as the Reykjanes Peninsula in Iceland. If there is any subterranean connection between the two islands it is very deep seated, for the sea is 1,000 fathoms deep a little to the south of Jan Mayen. A remark-



FIG. 5—Sunlight through the rifted fog lying low off the east of Iceland.

able thing about the formation of the island, which is about thirty miles long, is the great depth of water but a little way from the shore. Its volcano comes straight up from this great deep and the fifteen miles of lava ridge south of it is but the overflow of lava, reaching southward like the bone in a lamb chop. The mountain is entirely covered with glaciers, which are fed by the continually falling snows, the condensation of the heavy fogs that perpetually envelop its cold and lofty summit.

Botanically, ornithologically and geologically we thoroughly explored three of the fiords of the east coast of Iceland. One of them, Brimnesfjord, is little known, an elevated, glacial valley. We secured many museum specimens.

We established the fact that ice-free waters do sometimes exist

entirely around Jan Mayen, the charts and the records to the contrary.

We secured a valuable collection of photographs and sketches of the entire east coast and made cinematograph pictures of the shore and the glaciers as we steamed along.

We made a complete meteorological record across the ocean from Langanes to Jan Mayen and return. Taken in connection with the work done by *La Manche* these data are useful. Says the commander of that expedition: "A series of observations is important, but it is only one point of the changing series of seasons, and science has great interest in reviewing the work done ten years ago." Our records were taken nineteen years after those of *La Manche* so that we now have three "points" with enough time between to make them scientifically valuable for comparison, being taken over the same stretch of sea at the same time of the year. A table is given below for comparison of the last two "points."

We failed to land, but the mere act of landing without time to do systematic work would have been useless. We might have taken some of the twenty tons of coal left by the Austrians but this would have been a crime. This coal is for the relief of shipwrecked mariners or for any party wishing to winter.

READINGS OF BAROMETER, TEMPERATURE OF THE AIR AND OF THE SEA FROM
LANGANES, NORTHEAST COAST OF ICELAND, TO JAN MAYEN.
STEAM YACHT *Matador*, AUGUST 10-12, 1911.

DATE.	HOUR.	POSITION		BAROMETER.	TEMPERATURE	
		LAT.	LONG.		AIR.	SEA.
August 10	5 A.M.	66° 30' N.	14° 30' W.	762.0 mm	5.8° C.	6.3° C.
	7 A.M.			761.49	6.0°	7.2°
	12 M.	67° 15'	13° 15'	761.5	5.5°	6.4°
	2 P.M.			762.0	6.0°	7.5°
	9 P.M.			762.25	4.3°	7.2°
August 11	12 A.M.	68° 45'	11° 30'	763.01	5.3°	6.5°
	7 A.M.			763.27	5.2°	6.5°
	12 M.	69° 10'	9° 45'	765.82	5.0°	6.1°
	2 P.M.	off South Cape		765.82	5.0°	5.5°
	6 P.M.	{ 70° 57'	{ 8° 30' }	765.82	6.0°	3.5°
		{ Driftwood Bay }				
August 12	9 P.M.			766.57	5.0°	4.3°
	12 A.M.	{ 71° 12'	{ 7° 57' }	765.82	6.0°	3.5°
		{ Northeast Cape }				
	3 A.M.	{ 71° 0'	{ 8° 30' }	766.06	5.4°	5.0°
		{ Mary Muss Bay }				
	6 A.M.	{ 70° 50'	{ 9° 3' }	766.06	6.2°	6.0°
		{ Southwest Cape }				
	7 A.M.			766.06	6.5°	6.0°
	2 P.M.			767.08	8.0°	7.2°
	9 P.M.			767.08	7.7°	7.0°

NOTES.

A comparison of the barometer readings of 1882-3, 1892 and 1911 for the corresponding season of the year yields interesting results.

Mean Barometer in August, 1882.....	754.87 mm.
“ “ “ “ 1892.....	763.5
“ “ “ “ 1911.....	766.92

The Isobar for this season and locality is charted by Davis as 756.92. Our mean barometer reading for two weeks off the east coast of Iceland was..... 756.66, which corresponds to the given Isobar.

Again, there seems to be a great ocean eddy between Langes and Jan Mayen as shown by our sea temperatures, state of the sea and winds. The data cannot be given here for the deduction. The limits of this eddy are fifty miles north of Iceland and fifty miles south of Jan Mayen. The south flowing Arctic Stream along the east Greenland coast, and the northwest drift of waters off the west coast of Norway undoubtedly contribute to this condition.

HISTORICAL.

1607. HENRY HUDSON is usually credited with the discovery, having found the island on his return from Spitzbergen. It was long known as "Hudson's Touches."
1610. CORNELIUS DOETTS, a Dutchman, discovered the island, according to a chart printed at Amsterdam by Dirck Peters, which is now in the Museum of Bergen.
1611. JAN MAYEN, a Dutchman, discovered the island, according to one authority, and gave it his name. By this name it has been known since 1611.
- 1611-1690. Jan Mayen was a station for the Holland Whale Fishery. See *The Dutch in the Arctic Seas*, by S. R. Van Campen, for a full account.
- 1633-34. Seven Dutch sailors tried to winter on Jan Mayen. All died of scurvy.
1817. WILLIAM SCORESBY, Jr., roughly surveyed the island and wrote a brief account.
1856. LORD DUFFERIN, in the *Foam*, visited the island and landed for a few moments, after a hard fight with the ice. He did no scientific work.
1856. LA RONCIÈRE, a Frenchman, in the *Reine-Hortense*, closely following Dufferin, gave up the attempt when about 125 miles from the island on account of coal shortage.
1861. DR. BERNA, German, made a landing, but retreated on the sudden rising of the sea.
1869. KOLDEWAY, German, in the *Germania*, tried to land, but failed on account of the heavy sea.
- 1882-3. WOHLGEMUTH, in the *Pola*, established one of the thirteen International Circumpolar Stations in Mary Muss Bay on the 71st parallel. The party were chiefly engaged in meteorological work. They surveyed the island and constructed a fairly accurate chart. Our observations in 1911 show many inaccuracies.
1899. A. G. NATHORST, a Swede, on his expedition to the east coast of Greenland and Spitzbergen, stopped at Jan Mayen for a few hours.

1891. CHARLES RABOT, a Frenchman, in the *Châteaurenault*, starting from the French fishing station in Faskrudsfjord on the east coast of Iceland, was turned back by the ice barrier. He was accompanied by Auguste Gratzl, an Austrian, of the expedition of 1882-3. Their object was to examine the condition of the stores left there in 1883.*
1892. BIENAIMÉ and RABOT, French, again accompanied by Gratzl, in the *Manche*, visited Jan Mayen, entered Mary Muss Bay, and effected a landing on the 27th of July. They stopped but a few hours.
1911. STACKHOUSE Expedition in the *Matador* reached the island on August 11th, It is the purpose of this party to return in 1912, complete the survey of the land, make ocean soundings and, if the ice permits, make the Liverpool coast of Greenland.

* Greely, Handbook of Arctic Exploration, in referring to this expedition, places Faskrudsfjord, a fiord in Iceland, in Jan Mayen.

HANGING VALLEYS OF THE YOSEMITE*

BY

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COMPARISON OF THE YOSEMITE WITH OTHER VALLEYS.

The Yosemite Valley has often been compared with other valleys in an attempt to throw light on the question of its origin. Such comparison, to be of value in the present discussion, must be made between similar valleys which are known to have developed under different conditions. It is clearly inadmissible, for example, to compare the Yosemite with other similar valleys which have also been occupied by glaciers; or with V-shaped gorges in non-glacial regions. For this reason the comparisons mentioned by Turner (318-319) all seem to me inappropriate. So far as can be learned from maps and descriptions, every one of the valleys mentioned by him was either certainly or probably occupied by ice; or has no typical hanging tributary valley; or is a V-shaped young gorge with narrow bottom. Similarly, the discussion of hanging valleys given by the same author on an earlier page (271) is unconvincing, inasmuch as the hanging valleys cited are very short, or have partially graded their lower courses; and all are tributary to a main stream which occupies a narrow-bottomed V gorge of pronounced gradient. They

* Concluded from p. 837, November *Bulletin*, 1911.

are in no sense comparable with the hanging valleys tributary to wide open valleys, such as the Yosemite, which appear to afford strong evidence in favor of glacial erosion.

Instead of disproving the glacial origin of the Yosemite, the comparison of valleys suggested by Turner really affords strong evidence in favor of the theory of glacial erosion. It is no mere coincidence that of the six valleys named by that writer the two most unlike the Yosemite have presumably suffered little or no glaciation, whereas the four most like the Yosemite served as the outlets of extensive glacial basins. The areas of these basins may be determined roughly by drawing boundaries which shall enclose all of the strongly glaciated region tributary to the several valleys. Although this does not take account of the passage of ice from one basin to another across the present divides, the method is sufficiently accurate, when applied to alpine regions of strong relief, to enable one to discriminate between profoundly and slightly glaciated basins, and between basins which favor extensive erosion of the master valley, and those which do not.

The valley near Sugar Loaf, on the South Fork of the American River, is so little like the Yosemite that the contour map leaves one in doubt as to why they should be compared; for the contours represent a V-shaped gorge without hanging valleys, although a few of the tributaries have their lower courses somewhat over-steepened. The basis of comparison with Sawmill Canyon is simply that the latter "under favorable circumstances would widen out into a Yosemite"; but since this questionable statement involves the very point at issue, the comparison is not permissible. On the other hand, the small valley on the Middle Fork of Stanislaus River at the mouth of Niagara Creek bears some resemblance to the Yosemite by reason of its steep walls and flat floor; but the contour map shows such marked evidences of glaciation in the headwater portions of streams draining into this valley that it seems quite probable that a glacier traversed the valley and gave to it its peculiar form. The area of the glacial basin is smaller in this case than in the others mentioned below, and this may account for the small size of the glacial trough on the Middle Stanislaus. Hetch Hetchy Valley is truly another Yosemite, larger than the valley on the Middle Stanislaus, because it is the outlet of a larger and more profoundly glaciated basin. It is smaller than the real Yosemite, because its glacial basin, while very large, is very asymmetrical (Fig. 3 a). The ice streams, instead of flowing comparatively short distances to the center of the basin and there uniting to form a large and powerful glacier, as in

the case of the Yosemite Valley (Fig. 3 b), were compelled to flow almost clear across the basin before reaching the master valley, which they joined at various points along its course, instead of concentrating at one point. It should be remembered, also, that part of the ice of the Hetch Hetchy basin crossed the divide into the

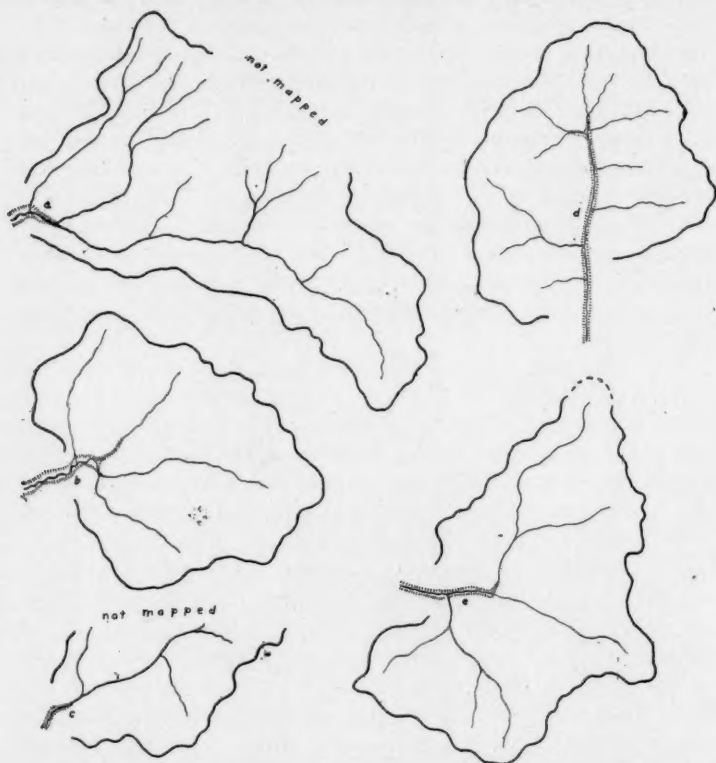


FIG. 3—Sketch maps showing relation of the Yosemite and other similar valleys to their glacial drainage basins. Stream lines indicate general direction of glacial drainage. Based on U. S. Topographic sheets. No account is taken of ice entering basins from beyond present divides. a, Hetch Hetchy Valley; b, Yosemite Valley; c, Tehipite Valley; d, Kern Cañon; e, Grand Cañon of Kings River.

Yosemite basin; but I believe the shape of the area draining into the Hetch Hetchy is the more important factor in determining the less profound glaciation of that valley.

Tehipite Valley is likewise the outlet of a basin (Fig. 3 c) in which glaciation was evidently very pronounced. While the glacial

trough form is marked, this valley is less striking than the Yosemite, presumably because its glaciated basin is less symmetrical and permitted less concentration of the ice streams than was the case with its more fortunate neighbor. The Grand Canyon of Kings River, the last of the valleys mentioned by Turner, is the outlet of a splendid glacial basin (Fig. 3 e); consequently it is itself a splendid glacial trough. One might add to the above list Kern Canyon, which has the trough form well developed, because it is the outlet of a basin (Fig. 3 d) in which glaciation was profound, and is so shaped as to admit of a fair concentration of ice streams. Yosemite Valley owes its preëminence to the favorable combination of several elements: (1) a remarkably symmetrical basin, which was (2) profoundly glaciated, and which permitted (3) intense concentration of ice streams, one of which was augmented by (4) overflow ice from a neighboring basin. Variations in the country rock doubtless played their part in giving to the different troughs different degrees of perfection; but I regard rock differences as of less importance than differences in the size, shape, and extent of glaciation, of the basin for which the troughs serve as outlets.

Turner has suggested (p. 318) that the Yosemite Valley may have acquired a depth of 1,000 feet by the beginning of the Pleistocene, and that this "lessens the difficulty of accounting for the present depth of the Yosemite and of other canyons of the southern Sierra." The elevation of the Merced River previous to glacial overdeepening was, as shown above, from 2,000 to 2,500 feet above the present level of the stream, or between 6,000 and 6,500 above present sea level. This may have been 1,000 feet below the higher parts of the imperfectly developed peneplain. In any case, the present hanging valleys appear to have been graded with reference to that elevation of the Merced, and the indications are that the Merced at that time occupied an open valley as did the tributaries. The difficulty which confronts the theory of stream erosion of the Yosemite is not the absolute depth of the canyon, but rather the relation of the broad-floored main valley to the hanging valleys. This difficulty is not lessened by imagining an earlier or later date for the initiation of canyon cutting.

The character of Tenaya Canyon has always been a serious difficulty in interpreting the Yosemite as a stream carved valley. Tenaya Creek, with a drainage area little if any larger than that of Yosemite Creek, flows through a wide open valley to an accordant junction with the aggraded floor of the open Yosemite Valley, instead of dropping 2,000 feet or more from a hanging valley. Assuming nor-

mal stream erosion, it is hard to see why one small tributary should be able to reduce its valley to grade and to open out its valley floor to a considerable width, while a similar tributary near by has made but a small beginning on so vast a work. Mr. Theodore Solomons has suggested that the Lyell Fork of the Tuolumne and its branches were formerly headwaters of Tenaya Creek, but have been captured by the Tuolumne River. This would account for a formerly larger volume of Tenaya Creek, under which condition the cutting of the canyon would seem less remarkable. Turner (276-277) discusses this possibility, but on the evidence of river gravels dismisses it as "very improbable." Even if we suppose that the Lyell Fork drainage formerly came through Tenaya Canyon, we still encounter difficulties in explaining the relation of the canyon to the hanging valleys. On the other hand, if we accept the very reasonable hypothesis that during the glacial period much ice from the Tuolumne Valley crossed the low divide into the Tenaya Basin, and thus agree with Turner (305-306) and Gannett (87) that the Tenaya Glacier was the largest ice stream which entered the Yosemite Valley, we have, on the theory of glacial erosion, an adequate explanation for all the features observed. The Tenaya Canyon owes its U-shaped cross-profile, and its depth below the hanging valleys to glacial erosion. The canyon is deeper and more imposing than other valleys tributary to the Yosemite, because it was carved by the most powerful tributary glacier. The small Tenaya Creek is even much deeper than corresponding portions of the main Merced River in the Little Yosemite Valley, because the Tenaya Glacier was larger and more powerful than the Little Yosemite Glacier.

THE LONGITUDINAL PROFILE OF THE MERCED RIVER

Reference has been made above to the fact that some of the streams entering the Merced west of El Portal, as, for example, Bear Creek and the North Fork of the Merced, have over-steepened lower courses. They join the Merced with accordant junctions, but a short distance back from the main river show an increase in gradient, while their upper courses are again of gentle slope. One should not be surprised to find a comparable feature in the main river itself, farther up stream. For while an even tilting would initially increase the gradient of the main river uniformly throughout its course, greater volume would allow the lower course to intrench itself more rapidly. If to difference in volume we add difference in rock resistance, it is easy to see how one part of the stream flowing in weaker

rock might intrench itself more rapidly than a part up stream on more resistant rock, thus developing a locally steep gradient which would gradually retreat up stream. Something of this nature is shown in the longitudinal profile above (east of) El Portal. It should be remembered that, west of El Portal, the valley of the Merced is unglaciated, while east of the western end of the Yosemite, the valley has been profoundly glaciated. Between these two points, El Portal and the western end of the Yosemite, the valley has been traversed by glaciers to some extent, and shows the effects of glacial erosion very distinctly near the Yosemite, but to a decreasing extent toward El Portal. Had the pre-glacial Merced possessed a well-graded profile in this region, we should expect to find now, as a consequence of glacial erosion, a gradual decrease in gradient above El Portal, until the gradient finally became approximately flat, or even reversed, in the Yosemite Valley, where glaciation was most profound. Instead, we find a very pronounced steepening of the gradient above El Portal, similar to the steepening observed in the lower courses of the non-glaciated tributary streams farther west. It is evident that before glaciation the main river had not completely graded its course, although it had pushed the over-steepened zone as far up stream as El Portal. From this point the profile rose rapidly to a level some 2,000 feet above the main portion of the Yosemite Valley, as shown by the position of the hanging valleys. The western part of the Merced was then entrenched, the eastern part still flowing on the uplands. Glacial erosion has greatly altered the profile of the eastern part, but some trace of the pre-glacial conditions persists in the over-steepened profile east of El Portal.

VALLEY WIDENING IN JOINTED ROCKS

One of the most evident relations in the present topography of the Yosemite Valley is the control of joint planes upon weathering and erosion. Impressed by the remarkable form of the Yosemite Valley as a whole and by the important influence of jointing upon the form of the valley walls, some observers have genetically connected the two, seeking to explain the former by the latter. Unfortunately, no one who supports this view has set forth in detail just how stream erosion on jointed rocks can develop valleys essentially different from those developed by stream erosion on unjointed rocks. A brief analysis of this phase of the Yosemite problem may not be amiss. Let us first consider the process of valley development in massive, unjointed rocks.

If a main stream incises itself with such rapidity that the walls weather back but slightly before a deep trench is cut, the stream will come to flow in a narrow chasm with more or less nearly vertical walls. The width of such a chasm is little if any greater than the width of the stream. Tributaries may entrench themselves more slowly, and so give rise to lateral hanging valleys. If we imagine weathering to proceed more rapidly, the walls of this valley will retreat as the stream cuts downward. Two factors operate to make the higher portions of the walls retreat farther than the lower portions. First, the higher portions are exposed to the influence of the weather for a longer time. Second, a greater transverse breadth of rock is in unstable equilibrium near the top of a narrow chasm than near the bottom. Just at the stream level no rock is in an unstable position, and weathering must proceed very slowly where gravity has little or no chance to remove the rock fragments. Hence, valley widening due to weathering is at a minimum at stream level. A little above the stream level a narrow segment of rock on each side is liable to fall down into the stream as fast as its parts are loosened by weathering. Here the valley may be widened slightly, due to weathering alone. The corresponding segment of rock which is liable to weather from still higher levels is much greater; so that the top of a valley may weather to a width of a mile or more while the bottom remains the width of the stream itself.

The above is perhaps an over elaborate statement of the well recognized relation between stream incision and weathering which results in the V-shaped cross-profile of most young stream valleys. It should not be inferred that the young stream does no lateral cutting while entrenching itself, for lateral erosion lends its aid to weathering in producing the width of the valley. But during the youth of a stream, when down-cutting is active, the effect of lateral cutting is ordinarily obscured by the far greater work of weathering. It is fair to say that during youth, valley deepening is largely due to stream cutting, valley widening largely due to weathering; whence it follows that a young stream cannot develop a broad, flat valley floor. Beginning with maturity, valley deepening becomes of small importance, and valley widening may be due more to lateral cutting than to weathering. A flat valley floor, many times the width of the stream, may be developed.

Let us now consider whether the above principles are modified in case the valley walls are intersected by joint planes. In order that joint planes may produce the greatest effect upon erosion forms, they must be neither too widely nor too closely spaced. If too widely

spaced, much of the valley will be carved in massive, unjointed rocks. If too closely spaced, the rock mass will be so badly broken up as to constitute an area of relatively non-resistant material of fairly uniform character; and only minor features of form will show the effect of joint control. Let us imagine, then, a region of massive rock, such as granite, traversed in several directions by joint planes of such frequency as to make the included joint blocks of large, but not excessive size. The process of weathering will certainly be facilitated by the jointing; but it does not appear that this structure can produce any essential modification of the ultimate result. Joint planes sloping toward the stream will allow weathering and gravity, to remove the granite blocks which are in an unstable position more quickly than would weathering in unjointed granite. The open V-shaped cross-profile will be the more quickly attained. But the large joint blocks at stream level are in a stable position, and no process of normal weathering is known which would pry them out of so secure a place against the pull of gravity, in order to widen the bottom of the V. They cannot be washed away by the stream itself. Whether massive or broken by joint planes, the rocks in the bottom of a gorge must wear away little by little, even though great joint blocks may fall from unstable positions high up on the valley walls. This holds true, no matter what varieties of jointing we imagine to exist. Vertical joints will leave temporary, vertical faces wherever a joint block falls from place. A vertical face is unstable, however, and must slowly weather back to a more gentle slope. If a stream quickly incises itself in vertically jointed rocks, we may have a narrow chasm with vertical walls. But as soon as weathering makes its effects apparent, we must have a markedly greater width at the top of the gorge than at the bottom, the latter remaining narrow so long as the stream is youthful.

Returning to the case of the Yosemite Valley, we observe an undoubted characteristic of youth in the hanging valleys. Yet the width of the main valley cannot be largely due to weathering, since the valley floor is broad and flat. Joint planes, such as would facilitate weathering, are present in the valley walls, and are evidently influencing the weathering now in process. But no process of weathering in jointed rocks can account for the great width of the valley floor. The hanging valleys confirm the conclusion that the width of the Yosemite is not due to weathering; for stream courses descending a valley wall are worn back, by erosion and weathering combined, at a faster rate than are the interstream areas where weathering alone is active. If the walls of the Yosemite had retreated by weathering, the

tributary streams, and especially the larger ones, should have cut so far back from the main valley as to have destroyed the hanging valley effect. Instead, we find the tributaries cascading down the main valley walls, or descending in slight re-entrants formed by the rapid breaking away of joint blocks which occupied unstable positions in the steep valley walls.

One can conceive that valley widening in jointed rocks due to lateral cutting by a shifting stream of early mature age might give a flat-floored, steep-walled valley; for when down-cutting is reduced to a comparatively negligible quantity, lateral cutting at approximately one level will widen the valley floor by undermining the valley walls. Granted the favorable combination of a graded, shifting stream eroding laterally with vigor, and rock walls which weather slowly in comparison with the rate of undercutting and which are traversed by vertical planes of weakness, we can imagine the removal of the valley walls to take place in such a manner as to leave vertical faces on the retreating cliffs.

That the broad floor and steep walls of the Yosemite Valley cannot have this origin is evident from the existence of the hanging valleys. The latter would have been reduced to grade before the Merced River could have accomplished so great a work as the grading of its course and the undermining of its walls by lateral cutting. The existence on the same stream of hanging valleys, a characteristic of young streams, and an open valley floor, a characteristic of mature streams, demands a special explanation.

There is a special set of conditions which may possibly constitute an exception to the above statement. If a stream follows a belt of very weak rock, between masses of very resistant rock, and an uplift permits rapid entrenching, the stream may have time to broaden its valley floor in the weak rock before the tributaries, held up on the hard rock, advance far in the process of grading their courses. That the combination of favorable circumstances necessary for the production of hanging valleys of this type is exceedingly rare, is evident from their almost complete absence in regions of normal stream erosion, even where alternate belts of resistant and non-resistant rock exist. There is no evidence that any strong contrast in rock resistance existed between the granite removed to form the Yosemite Valley and the granite which remains in the valley walls. Jointing will not explain the phenomena unless we imagine a zone of granite so badly jointed and crushed as to give a belt of weak material of the width and pattern of the Yosemite Valley, all of which has been quickly removed, leaving granite of markedly different character in

the present walls. A far more reasonable hypothesis is to regard the Yosemite Valley as one of the many open main valleys with hanging tributaries which characterize every region of Alpine glaciation, and which are reasonably interpreted as the product of glacial over-deepening of pre-existing river valleys.

It may be pointed out that the remarkable effects of jointing observed in the walls of the Yosemite are indirectly due to glacial over-deepening and over-steepening. Not until glacial erosion had made the steep-sided trough, was full opportunity given for the joint blocks to fall from place leaving the angular re-entrants and vertical faces which form such an important element in Yosemite scenery. Weathering and gravity have worked to great advantage in the recent past, and the resultant features are bold and striking. In the future, as the walls wear back to more gentle slopes and the more stable position of the joint blocks causes them to waste gradually away instead of falling in large masses from the cliffs, the valley walls will become cloaked with debris, the bold features of today will give place to more flowing, graded profiles, and the grandeur of Cathedral Rocks, Three Brothers and Half Dome will be a thing of the past. The influence of jointing on weathering is thus to be interpreted as an indirect effect of the glacial origin of the valley, rather than as an important agent in the formation of the valley.

THE NOTCHES BESIDE THE FALLS

As an observer stands in the Yosemite Valley and views the cataract of the Yosemite, Lower Yosemite, Illilouette, Vernal or Nevada Falls, he notes that beside each fall is a deep notch which the stream curiously avoids, to fall over a sheer cliff, as if to provide for man the most stupendous spectacle possible. Branner has given us a good description of this peculiar topographic feature (547-553), and has attributed the formation of the notches to the action of the several streams during a time when they were displaced from their normal positions by ice. A glacier occupied the bottom of each valley, forcing the stream to take a course some distance to one side, where it was held between the ice and the valley wall. While in this position the notch was cut. When the glacier disappeared the stream returned to its former position, leaving the notch deserted. Inasmuch as the stream cut the notch back faster than the glacier eroded its channel, it was argued that glaciers must have very little eroding power, and that the Yosemite Valley must therefore be the result of normal stream erosion in jointed rocks.

The present visitor to the Yosemite may profit by Matthes's excellent topographic map, which was not available when Branner wrote his account of the notches. An inspection of the map, suggests the necessity of some modification of this author's interpretation, and the field evidence confirms the suggestion. The notches beside Lower Yosemite Falls, Illilouette Falls, and Vernal Falls do open up at a higher level in the floors of the valleys in which they were cut, as required by Branner's theory. But above these notches are no signs of abandoned stream channels, and in the notches are no signs of stream erosion. On the other hand, the notches are seen to result from the normal weathering away of granite along oblique joint planes. When

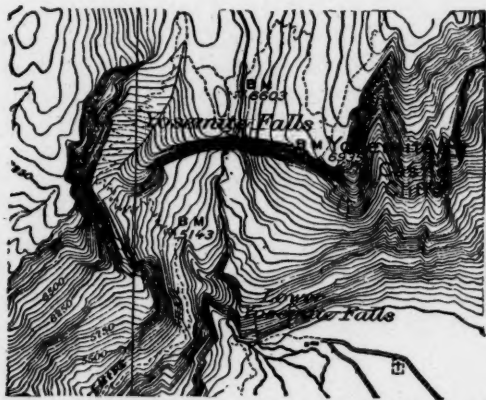


FIG. 4.—Yosemite Falls. Showing abandoned stream-carved notch to the west, through which the trail passes. West of the Lower Yosemite Falls is a notch due to weathering along joint planes.

we remember that over-deepening of the main valley left the steep valley walls (and likewise the rock steps in the main valley) in an unstable condition, it is easy to realize how the granite would break down rapidly wherever cut into blocks by jointing; and how successive blocks breaking from the lips of hanging valleys would leave oblique scarps in case principal joint planes intersected the axes of the valleys at oblique angles. An oblique scarp meeting the valley wall on one side of the stream would give such a notch as we find at each of the three falls in question. The notches at Vernal Falls (Fig. 6) and Lower Yosemite Falls (Fig. 4) are developed on NW-SE joints belonging to the same system as the joint which gives form to the southwest face of Mt. Broderick and Liberty Cap. The notch at Illilouette Falls (Fig. 5) is due to a NE-SW joint plane, similar in direction to those which appear at Nevada Falls and on the steep face of Half Dome.

The notch at Nevada Falls (Fig. 6) is undoubtedly a stream carved notch, but it does not open on the side of the valley wall as represented in Branner's sketch map. Indeed, it opens so squarely in the

bottom of the valley above the falls that a small part of the water of the Merced River escapes through the notch, diminishing the volume of the falls by so much. The size and form of the notch, and the large water-worn boulders found in it, indicate that the entire river passed through it at one time. It does not seem necessary to invoke glacial displacement to get the stream in the notch, since part of the stream flows naturally into it even now. A simpler interpretation is that the notch was cut in the bottom of the valley under normal conditions, and that a slight displacement, possibly a glacial advance, turned the stream into its present course over the cliff.

The notch beside the Upper Yosemite Falls is similar in origin to that beside the Nevada Falls. Yosemite Creek formerly flowed through the notch, but was shifted to its present position, doubtless by a late advance of the Yosemite Creek Glacier. It would seem that Yosemite Creek acquired its abnormal position earlier than did the Merced River at Nevada Falls, since the creek has had time to entrench itself to a noticeable extent, although the probable former course of the creek may still be observed in the depression above the notch which is followed by the trail for some distance.



FIG. 5.—Illilouette Falls. Showing notch due to weathering along joint planes.

The existence of two distinct types of notches beside the falls in the Yosemite region is clearly shown by Matthes's map, from which the above figures are reproduced. In fact, my first appreciation of their dual character came from a study of the map. After this paper had been prepared for presentation at the geological meetings in Boston during the last convocation week, I learned that Matthes recognized the dual character of the notches during his field work.

Returning to the question as to what evidence the notches offer concerning the relative efficiency of stream and glacial erosion, it should be noted that the notches at Lower Yosemite Falls, Illilouette Falls and Vernal Falls afford no evidence on this question since they were formed independently of stream erosion. The notches at Upper Yosemite Falls and Nevada Falls were carved by stream erosion after the main valley had been over-deepened, and before the

ice advance which displaced the streams to their present positions. According to the theory of glacial erosion the main valley was over-deepened by ice action. Hence the notches are of inter-glacial age—*younger than (part of) the glacial deepening of the main valley, and older than the glacial displacement of the streams to their present courses.*

Post-glacial cutting has formed only insignificant notches where the streams now pass over the ledges. Making no allowances for

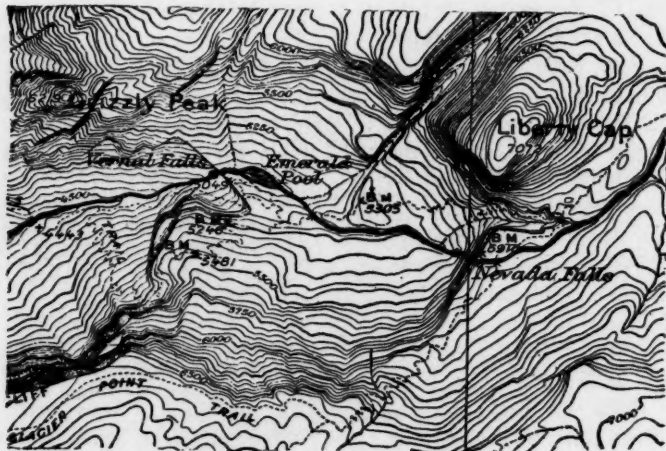


FIG. 6—Vernal Falls and Nevada Falls. Just south of Vernal Falls is a notch due to weathering along joint planes, while north of Nevada Falls is a notch carved by the stream. Trails pass through both of these notches.

difference in volume and load of streams in inter-glacial time, it would appear from the relative sizes of the notches that post-glacial time has been short as compared with inter-glacial time. On this interpretation the notches afford no evidence one way or the other as to the efficiency of glacial erosion.

CONCLUSION

The Yosemite Valley is a young glacial trough of great depth, whose walls of jointed granite are in a youthful stage of weathering, and whose floor has been maturely aggraded by the main stream. The position of the trough was determined by a preëxisting river valley which guided the advancing glacier. Extensive glacial erosion was favored by the shape of the glacial drainage basin, which permitted different ice streams to converge at one point and form the

unusually vigorous Yosemite Glacier. Glacial over-deepening exceeded 2,000 feet in the Yosemite region, and produced the remarkable hanging valleys for which the region is famous. Glacial over-steepening produced the steep valley walls, and made possible the effective weathering along joint planes, to which the details of cliff sculpture are due. Many of the notches in the lips of the hanging valleys are due to the joint-controlled weathering; but some are stream carved notches, deserted by their streams because of glacial interference. Both types of notches are expectable features in the side of a glacial trough located in jointed rocks.

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THE ERUPTION OF TAAL VOLCANO

The following account of the eruption of Taal Volcano on January 30, 1911 is abridged from a paper prepared by Mr. Walter E. Pratt.*

Taal Volcano, in southwestern Luzon, "began throwing out steam and mud on January 27, and continued in eruption with increasing violence during January 28 and 29, culminating in an explosive out-

* *The Philippine Journal of Science*, Vol. VI, 1911, No. 2, pp. 63-83. 3 figs. in text and 14 plates of photo-engravings and maps.

burst early on the morning of January 30, which laid waste the surrounding country over an area of 230 kilometers, killing practically all life within this area. Mud or ashes spread over more than 2,000 square kilometers in southwestern Luzon. The activity diminished gradually to a state of normal quiescence by February 6 to 8."

Mr. Pratt's paper "embodies personal notes made during the two weeks immediately succeeding the eruption. In this time every part of the devastated region was visited. Information as to what happened on the night of the eruption was secured by conversations with people who had witnessed it at close range from different points of view. On January 30, the writer went to Bañadero, a town near the volcano, and during a large part of the subsequent field work Mr. Charles Martin, photographer of the Bureau of Science, was with him. Mr. Martin also was on Volcano Island just before the main eruption. . .

"Taal Volcano near the center of Lake Bombon may be said to constitute an island with the active crater centrally located on it. Its rim is low, varying from 100 to 320 meters in elevation. Its floor stood just above sea level prior to this last eruption. The volcano is about 60 kilometers south of Manila. The crater has an area of about 3 square kilometers, the island contains about 25 square kilometers, and Lake Bombon covers an area of approximately 320 square kilometers. Each is roughly oval in general outline. There were seven small *barrios* (villages) on the island and Lake Bombon was fringed with the homes of native fishermen and sugar-cane planters. . .

"There is no evidence that lava ever flowed from Taal Volcano. The crater walls, the island, and the whole surrounding country are composed of bedded volcanic tuff and agglomerates. Volcano Island contains a number of small extinct craters or cinder cones and it is generally conceded that volcanic activity formerly covered the whole area of the present lake, either as a single great crater or more probably, perhaps, as a large number of smaller craters. For a concise discussion of Taal Volcano, its geology and historic eruptions, the reader is referred to the work of Dr. George I. Adams.*

"The first intimation of the approach of the eruption was obtained from the increased size of the cloud of steam which always hangs over the active crater, and also from mild earthquakes. People as far away as Batangas (about 30 kilometers distant) began to be alarmed by these conditions on Friday, January 27. The earth-

* Geological Reconnaissance of Southwestern Luzon. *Philipp. Journ. of Sci.* Sec. A (1910) 5, 57.

quakes increased rapidly in violence and number and, on the following day, the immense white cloud, plainly visible from Batangas, was frequently blackened by the ejection of mud. The cloud rose in explosive outbursts, which were often immediately preceded by a perceptible earthquake shock. A noticeable amount of mud had already fallen on the slopes of the volcano when Mr. Martin reached the island on Sunday morning, January 29. At about 3.30 Sunday afternoon large cracks opened in the earth near the towns of Lemery



FIG. 1.—Map of a part of Southwestern Luzon showing area covered by mud from the eruption.

and Taal. Probably also the small fissure at Talisay appeared at this time. There were fewer earthquakes recorded on Sunday than on the previous day, although severe shocks accompanied the appearance of the earth fissures. Apparently, the activity of the volcano was slightly lessened on Sunday afternoon. On Sunday evening the activity began to increase again about dark with violent outbursts from the volcano and sharp earthquakes. About 11 P.M. a very severe earthquake was followed closely by the ejection of a massive

black cloud from the volcano. From this time on, it appears, the cloud above the volcano was very frequently crossed and streaked with lightning, and often showed flashes or sheets of light. Some people saw incandescent bodies rising out of the crater and falling in graceful curves to the earth. At 1 o'clock in the morning, another outburst occurred, probably more violent than the one at 11 o'clock, but similar to it. At 2.20 o'clock in the morning, without any severe earthquake, but accompanied by a loud noise, resembling an explosion, the culminating outburst of the eruption took place. The great black cloud shot up higher than before and finally spread out at the top like an umbrella, or a giant cauliflower. The lightning became much more intense, there was much explosive noise and at some places, such as Talisay and San Nicolas, a strong wind came from the volcano. At Bañadero there was little wind, but mud began to fall. Very soon the lake suddenly rose about 2.5 meters. The mud at Bañadero was cool and fell like rain. The activity decreased gradually, and by daylight the cloud from the volcano was again white.

"This main eruption awakened many people in Manila, and in Dagupan, 240 kilometers north of the volcano, people say they were awakened at about this time by hearing a noise. The effect in Manila was that of a tremendous vibration, accompanied by the rattling of windows and loose doors. The noise seemed to pass over the city in a great wave, so that it was heard farther away, after it had ceased close at hand. No earthquake was recorded in Manila at this time."

"The eruption cloud, which rose over the volcano, emerged from the crater with explosive violence, rose rapidly to a great height and finally spread out at the top in a horizontal layer. It is doubtful if its burden of solid ejecta reached a greater height than 3,500 meters. A feature of the movement of this explosive cloud was its terrific sweep downward and outward from the crater rim. The evidence of this movement is obtained from its effect on the vegetation on the lower slopes of the volcano and the west shore of Lake Bombon. The heavy growth of cogon grass was flattened absolutely and patches of forest except where protected by the topography were completely destroyed though not burned. Broken ends of tree stumps and branches were literally shredded as though exposed to the action of a powerful sand blast. Outside the central area over which this explosive expansion of the gases was felt the eruption caused only a rain of mud which fell gently.

"This downward and outward movement is difficult of conception

to those who saw the steadily rising cloud above the volcano during the activity. However, when it is recalled that explosions tend to act equally in all directions, downward as well as upward, and when it is remembered that the air above the crater was already heavy with condensing steam and falling mud when the main explosion occurred, it is apparent that expansion would naturally take place in the manner described. . . It is probable that at a greater distance from the crater than was attained by this outward expansion, the atmosphere moved toward the volcano, as a center of low pressure resulting from the upward rush of the cloud. Such a movement is evidenced by the sudden falling of barometers around the volcano. In Manila, an otherwise regular barograph at the Weather Bureau Observatory shows a sharp drop of 1 millimeter at the moment of the eruption. At Batangas a similar drop amounted to 2 millimeters. At both these places there was a slight wind toward the volcano after the eruption. . .

"For an hour or more during the greatest activity the cloud above the volcano was vivid with lightning which played in streaks, often branched or forked, and ran either up or down or obliquely over the cloud. . . Spectacular electric displays have been prominent features of many volcanic eruptions. Special descriptive names have been applied to this particular type of lightning.* Its origin has been ascribed to the generation of electricity by the intense friction occurring between the individual ash particles in the moving cloud.† Probably friction between ash particles and the air or friction of the vapor-laden gases of the rising cloud with the surrounding drier atmosphere, are contributing causes.

"The earthquakes ‡ accompanying this activity of Taal are tabulated in chronological order in a report "The Eruption of Taal Volcano, January 30, 1911" written by Father Miguel Saderra Masó, Assistant Director of the Weather Bureau. Father Masó concludes that the earth-movements were very local, that they emanated from the immediate vicinity of the volcano and that they lost intensity very rapidly as they traveled away from that center. The most violent earthquakes recorded in Manila were of intensity IV of the earthquake scale of De Rossi Forel § and Father Masó thinks it probable that even in the vicinity of the volcano no shock occurred more intense than VII. || Consequently, a shock of intensity III at

* Hovey, E. O., Martinique and St. Vincent, *Bull. Am. Mus. Nat. Hist.* (1902), 16, 333.

† Scrope, G. P., *Volcanoes*, London, 2 ed. (1862), 57.

‡ The earthquakes in connection with the eruption of Taal will be the subject of a special bulletin of the Philippine Islands Weather Bureau.

§ Strong enough to shake movable objects, chairs, and windows, etc.

|| Strong enough to overturn movable objects, shake off plastering, etc.

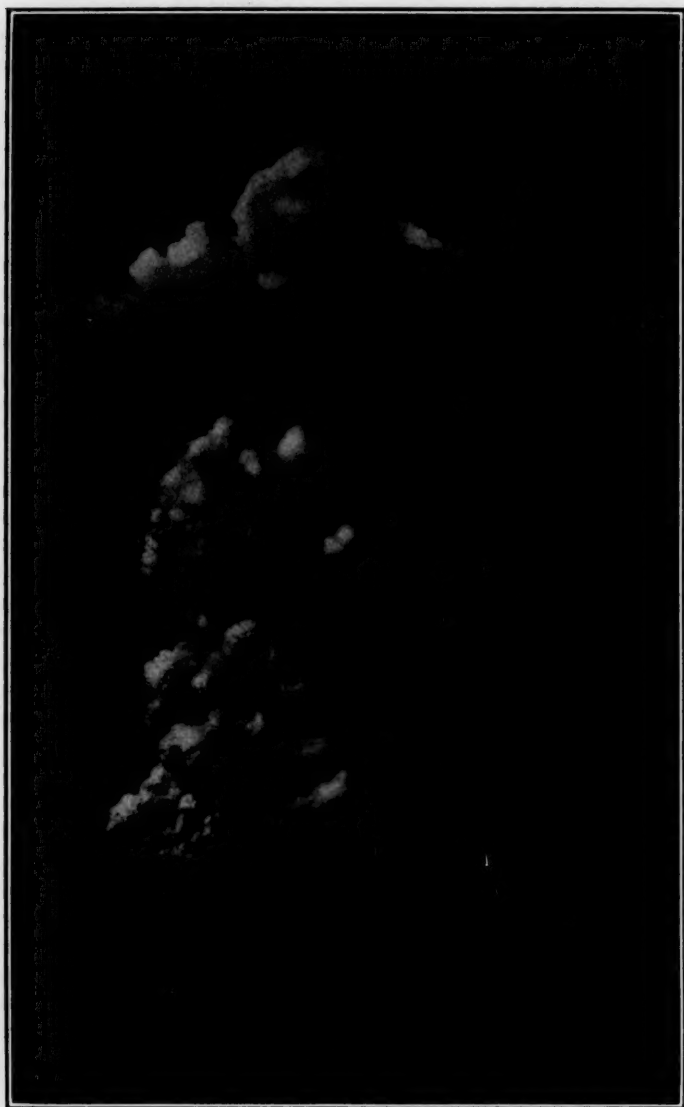


FIG. 2.—Eruption cloud as it appeared from Bañadero, January 30, 1911.

the volcano might not be felt in Manila at all. It is beyond question that a great many more shocks really did occur near the volcano than were recorded in Manila. The local extent of the earthquake shocks suggests that the center of Taal's activity was not at a great depth. . .

"Damage due directly to earthquakes was slight. The towns of Taal and Lemery were most shaken. In Lemery the tower of the Casaysay Church was partly demolished. Masonry gateposts in the wall which surrounds the church were overturned and fell to the west. This church is directly in the line of one of the fissures and some of the damage is evidently due to the vertical displacement along it as the west side dropped. . . Numerous small landslides occurred in the steeply eroded hills of volcanic tuff to the west of Lake Bombon. The shocks cracked and displaced several old masonry walls in Talisay.

"Lake Bombon rose suddenly just after the main eruption. This wave (or series of waves close together) washed up on the lake shore through a vertical distance of 2.5 or 3 meters carrying away houses and causing loss of life in some of the *barrios*. If, as seems established, no severe earthquake occurred for some time before this wave was observed, its cause must be sought in another direction. The whole of Volcano Island sank from 1 to 3 meters. . . It is probable, on the whole, that the island sank gradually, causing only minor earthquakes and very slight disturbance to the lake surface. The explosive rush of gases down the volcano slopes affords a possible explanation of the water wave. This blast, the strength of which is intimated by the absolute destruction it wrought, moved with a considerable downward component (tending to expand equally in all directions) until the moment it reached the lake level. Responding to this downward pressure, the lake surface would be depressed, and its reaction would cause a wave or waves. Thus, the water would have literally been blown away from the volcano to the lake shores.*

"The known ejecta from Taal in this eruption were (1) steam (probably water also), (2) sulphur dioxide, (3) angular pieces of homogeneous extrusive rock, (4) fragmental blocks of volcanic tuffs and agglomerates, and (5) volcanic mud or ash. Steam made up

* It is difficult to estimate the velocity of expansion of the eruption cloud at the time it reached the lake level. Generally accessible data show that a wind velocity of 100 miles (160 kilometers) per hour is sufficient to uproot large trees. Large trees were uprooted 2 kilometers inland from the west lakeshore. Since the velocity must have decreased very rapidly as the expansion progressed, it may have been as high as 200 miles (320 kilometers) per hour at the foot of the volcano. Wind moving with this velocity would exert a pressure of 200 pounds (Trautwine, John C., London, 17 ed. (1900), 321) per square foot (4 kilograms per square centimeter), sufficient actually to support a column of water 1 meter high. This estimate does not take into account the considerable inertia of the dense load of mud or ash which traveled with the wind, and which would increase its effect.

practically the whole volume of the gases. The odor of sulphur dioxide was strong during the eruption and probably this gas or its oxidation product was effective in killing vegetation.* Other gases, notably carbon dioxide, may have been present in the cloud. There was apparently no odor of hydrogen sulphide and there is no evidence of the presence of other inflammable gases.

"The angular boulders thrown out ranged up to perhaps 300 kilograms in weight. The large rocks fell on the upper slopes of the volcano near the crater's rim. Andesitic specimens and others of basaltic character, neither with any appearance of recent fusion, were noted. . . . The blocks of tuff thrown out are identical in appearance with the bedded material of the crater walls. Some of the fragments weigh perhaps 200 kilograms. Other large pieces had broken from the impact of their fall. Bedding planes could be distinguished in many fragments. . .

"Fig. 1 shows the distribution of solid ejecta from Taal. Three roughly concentric areas have been outlined. The smallest one, 230 square kilometers, includes the devastated region where man and large animals were killed by the direct action of the volcano. It also limits approximately the area over which the fall of mud or ash exceeded 10 centimeters in average thickness. The next larger area is approximately that over which the average thickness of the fall of mud exceeded 1 centimeter. Over the largest area, 1,940 square kilometers, the mud formed a noticeable continuous coating, more than 1 millimeter (approximately) in thickness; beyond this limit it was only visible by close observation.†

"The greatest fall of material within the devastated area was on the west slope of the volcano. The maximum thickness of two meters noted here occurred where the ash and small fragments had drifted into an old water course. However, the ridges adjacent were all but bare, and therefore an estimate of 20 to 30 centimeters for the

* At Bañadero, where cool mud fell without violence to the depth of 1 centimeter, the leaves of the trees retained only a thin coating on their upper surfaces, yet within twelve hours many leaves and some fruit, such as oranges and wild fruits, had fallen, suggesting an effect of poisoning from the mud. Ultimately, all leaves and fruit in this section died. In several instances clothing, such as brown flannel shirts, white towels, etc., on which mud fell at Bañadero, was stained yellow. In San Pablo the fall of mud was very light, "like sugar sprinkled over a cake," yet garden plants were killed by it according to Mr. W. E. Crowe, supervising teacher.

† Comparing these areas to similar areas from the eruption of Mont Pelé in May, 1902 (see Hovey, E. O., *Am. Jour. Sci.* (1902), 14, 320), it develops that Taal devastated more than twice the area that Mont Pelé did, although the eruption was probably of much lesser magnitude. The ashes from Pelé spread over an area probably ten times as great as those from Taal. The crater of Mont Pelé is 1,280 meters above sea level, while Taal in places is as low as 100 meters. Thus the eruption from Mont Pelé had much more room for downward expansion, and the same energy at the crater threw its ejecta much higher in the air than in the case of Taal.

average maximum depth of fall for this vicinity is probably reasonable. . .

"The system of fissures which formed during this eruption is significant of the relation of Taal Volcano to the general structure of the region. This subject has been one of considerable interest to geologists who have studied this area. Centeno* placed Taal on an approximately north and south line with Mount Arayat in the central valley of Luzon north of Manila. Adams† thinks it probable that Mount Arayat is on the same structural line as Taal and argues that the general trend of structure in southwestern Luzon is to the north-

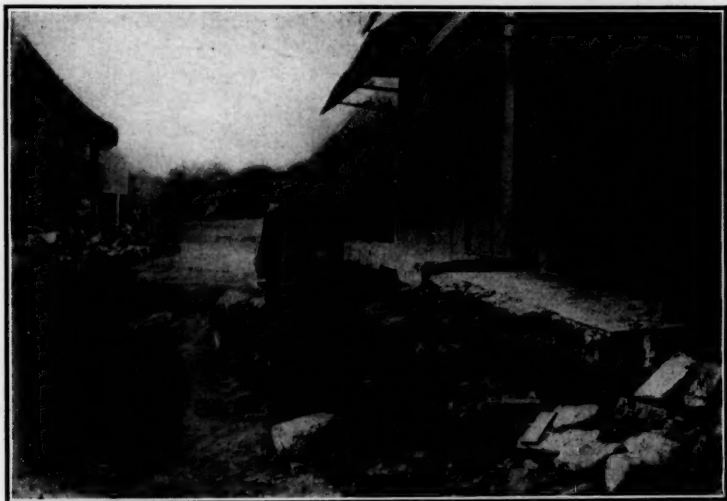


FIG. 3—Fissure in town of Lemery. Looking east.

west. However, he suggests the possibility of a line through Balayan Bay, Taal Volcano, and Laguna de Bay, and sees a possible elevated fault-block in the high ridge north of Lake Bombon and west of such a line.

"The trend of the recent fissuring indicates a line of weakness passing through Taal Volcano and bearing about N. 30° E. This trend extended beyond the limits of the system and runs closely parallel to the east coast of Luzon and the length of Palawan, passing through Laguna de Bay and Balayan Bay. The earthquakes

* *Estudio Geológico del volcán Taal, Madrid*. Tello (1885).

† *Philippine Jour. of Sci. Sec. A* (1910), 5, 101.

were strongest in Taal and Talisay, along this line. The alignment of craters on Volcano Island conforms well with such a trend as do also the outline features of both island and lake. No recent fissure could be traced across the island itself, a fact scarcely explained by the greater fall of ash. If the fissures noted owe their trend entirely to movement radial from the crater their location is still significant, since careful search discovered no other radial fissures around the lake. The fissures are vertical, remarkably regular, and show only a vertical (no lateral) displacement. Where the displacement exceeds about 20 centimeters there is a sharp break and resulting scarp, otherwise only a gentle roll along the line of trend is evident. Generally speaking, the maximum displacement is along the central portion of the fissure, decreasing gradually to each end. It should be noted that displacement did not take place completely at the time the fissures appeared. It increased perceptibly for several days, during which earthquakes were frequent, after the opening of the fissures.

"The two most prominent fissures occur along the bases of the walls of bedded tuff which form the main terraces of the Pancipit River Valley. Their vertical displacements vary up to about 3 meters, and their scarps face each other across the valley. The intermediate fissures have displacements not exceeding 1.5 meters (averaging about 0.8 meter). The whole system bears an evident relation to the existing structure. The intermediate fissures occur on relatively high ground, around which the Pancipit River makes a wide detour to the west. The ground surface slopes to the east, the strata (tuff) dip slightly to the east and the fissure scarps generally face the east. In the town of Lemery, a minor fissure leaves the general trend of the system to follow the contact between the tuff and recent alluvial for a short distance.

"There is a noticeable tendency to maintain the displacement along the trend of the system by alternate parallel fissures. One fissure begins where another ends; thus the system presents a staggered arrangement.*

"Along the main fissure in the town of Lemery the displacement was accomplished by dropping of the lower side, while the upper remained stationary. This is evidenced by the fact that the sea now comes inland farther than formerly on one side of the fissure, and remains at its old level on the other. Whether or not this was the usual occurrence is not certain, but judging from the positions of

* See Hobbs, William Herbert, *Earthquakes*, New York (1907), 72.

the two main fissures and the fact that the displacement generally took place after the earth stresses had apparently been relieved, this instance would be typical. . .

"Little violence, other than sharp earthquakes, seems to have accompanied the formation of these fissures. Natives say that a rush of gas occurred when the large one along the west side of the Pancipit Valley opened. Several people noticed clouds of dust shoot up along other fissures of the system. At Sinaysian, a *barrio* near the seacoast on the large fissure just mentioned, a number of gushing springs were noted soon after it opened. These springs are not exactly on the fissure, but occur irregularly over a small marshy area in the adjacent alluvial formation. On February 18, there were about twenty still very active, gas escaping into the air with considerable noise, and mud and water gushing up to a height of about one-half meter. . . Most of the springs had built up mud cones, perfect craterlets of fragmental tuff, perhaps 2 meters in diameter and 30 centimeters high. Both gas and water were at ordinary temperature. . .

"The most striking subsidence noted was that of Volcano Island itself. Here it was general around the whole perimeter, amounting to more than 3 meters in places. Longos Point was cut in two and the resulting small island is separated by water a meter in depth from the main island. . . A new beach is building over an old sugarcane field on the southeast shore of the island. Cogon grass and stumps of trees with their roots intact could be seen all around the island beneath about 1 meter of water. The relative level of the lake is changed. It is lower by about 1 meter on its south shore line and is lower by a smaller amount on its north shore. The water in the upper part of the Pancipit River stands at a lower level now than formerly. The subsidence of Volcano Island would tend to lower the level of the lake on its shores but apparently not to such an extent as has occurred. It is not improbable that the whole shore line of the lake has risen slightly, reacting from the subsidence of the island at its center.

"Outwardly, Taal Volcano was little changed by the eruption. The absence of vegetation and the smooth drifted surface of the ash covering which is almost white in the sunlight, give the island an appearance of a vast snow heap. The crater rim is unbroken and save for minor fissures and cracks is intact. Sulphur is burning rather vigorously part way down its outside slope on the north side of the crater. This had never been noted before the eruption.

"The interior of the crater has been transformed. The well-known Green Lake and Yellow Lake, which were small bodies of water, one of which (Yellow Lake) was quite shallow, are gone. In the position of the former Green Lake there is a new one, the water of which appears milky-white, due to suspended solid matter. The level of this lake was on February 17 approximately 70 meters below that of the sea. Green Lake had stood 5 meters above sea level. Two streams of hot water, the combined flow of which was estimated at 100 to 150 cubic meters per minute, were pouring into the lake. These streams came out of the crater walls about 50 meters above the lake level, seeping from just over a layer of fine-grained, impervious, bedded tuff. On the west shore of the lake a conical rock 50 to 70 meters in diameter rose to a height of 115 meters above the lake level. The upper 50 meters of this natural obelisk appeared to be bedded tuff, but the lower portion is massive basalt. A week later, the streams pouring into the crater lake had increased both in volume and in number, and the lake itself had risen apparently about 5 meters. The present lake is boiling at a number of places and great volumes of steam arise from its surface. There is no evidence of a general subsidence in the crater. . . The new floor, exposed by the streams flowing across it, is composed of dense, basaltic material, hard and flowlike in appearance, certainly in place. It is probable that the change in the level of the crater floor was due to removal of material from the crater, not to the collapse or subsidence of the old floor.

"An approximation of the volume of solid material ejected from Taal Volcano is readily obtained by calculation from the data given in connection with the distribution of the ejecta. Disregarding irregularities in the ground surface, the volume of the solid represented by plotting sections, from the average depths shown, across the area covered, is 70 to 80 million cubic meters. Calculating in a similar manner the volume between the old and the new floor lines in the crater, according to areas and cross sections, the approximate figure of 45 million cubic meters is obtained for the volume removed above the level of the new lake. Examination of the crater walls below the old floor line reveals that a large portion of the material removed was rather dense, bedded tuff. If this material were ground up to a fine sand or ash and spread out in a thin layer, as mud, it would probably occupy at least one and one-half times its former volume, or about 68 million cubic meters. While these figures are approximate and represent at best only the order of magnitude of the volumes sought, yet it is evident that enough surface material was re-

moved from the crater, allowing only a shallow depth for the new lake, to make up the volume of the solid ejecta. The appearance of the ejected mud, its low temperature, and its irregular character, all bear out the conclusion that it consists almost entirely of the material removed from the surface. The few incandescent stones may have come from slightly lower down in the volcanic throat, but even these were probably originally thrown out by former volcanic activity and were only worked over recently. . .

"The official report . . . estimates the human dead at 1,335. There were recovered and buried 732 bodies. Of these, 106 were found on Volcano Island and 618 along the west shore of Lake Bombon between the *barrios* of Subig and Bayungan, inclusive. Taal exerted a devastating violence over an area of approximately 230 square kilometers (part of this area was lake surface; the land surface devastated was about 98 square kilometers). The greatest distance from the volcano at which an appreciable depth of ash fell is about 52 kilometers. . .

RÉSUMÉ

"First, the eruption of Taal Volcano on January 30, 1911, was probably the most severe, considering the number of lives lost and the damage caused, the area of the region affected and the changes wrought in the volcano itself, which has occurred in historic times in the Philippines. It was of the explosive type, the violent activity continuing only a few hours, and the attendant phenomena being typical of this class of eruption.

"Second, the principal ejecta from Taal Volcano during this eruption were steam and volcanic ash or mud. Some incandescent stones were thrown out. The volcanic ash or mud probably resulted from the attrition, by mutual friction within the cloud, of bedded tuff which was torn from the floor of the crater. Little, if any, ejecta came (recently) from a great depth. The mud or ash spread over an area of 2,000 square kilometers.

"Third, the violent action of the eruption was more effective to the west of the volcano, due largely to the contour of the crater rim.

"Fourth, a system of earth fissures opened during the eruption, the trend of which indicates a tectonic line passing through Balayan Bay, Taal Volcano, along the probable fault block, the eastern scarp of which is marked by Mount Gonzales, and through Laguna de Bay. Towns along this line near the volcano suffered most from the earthquakes accompanying the eruption, and are most liable to damage from earthquakes during possible future eruptions.

"Fifth, general subsidence of the ground level took place over a considerable area after this eruption. The island on which the volcano is located subsided and the surrounding lake changed its level. The crater was materially deepened through the removal of material from its floor.

"Sixth, the most significant thing about this eruption is the probability that all its solid ejecta were surface material and the apparent absence even at the seat of volcanic activity of molten lava, which most theories of vulcanism require to account for this type of eruption.

"Seventh, the chief agent of destruction and the main cause of death resulting from the eruption was the explosive expansion of the escaping steam, which was violent owing to its movement and suffocating owing to its heat, its burden of mud, and a content of sulphur dioxide.

GEOGRAPHICAL RECORD

AMERICA

STATE GEOLOGICAL SURVEY OF ILLINOIS. Mr. Frank W. De Wolf, Acting Director, has obliged the Society with the following notes on the progress of the work of the Illinois Geological Survey during the past field season:

Mr. Fred H. Kay, formerly of the U. S. Geological Survey and the Southern Pacific R.R., was added to the force as Assistant State Geologist on July 1. He will especially work on a cooperative study of the mining industry, the other parties being the U. S. Bureau of Mines and the Mining Department of the University of Illinois.

Mr. R. S. Blatchley continued office work on a report on the Eastern Illinois Oil Field. This field produces in the neighborhood of 30,000,000 barrels annually. Mr. G. H. Cady and Prof. U. S. Grant of the Northwestern University were associated on a survey of quadrangles along the Illinois River in the vicinity of LaSalle. These include the section reaching from the Lower Magnesian limestone to the upper part of the Carboniferous and also two or more glacial drifts.

Prof. J. A. Udden of Augustana College, at Rock Island, made a geological survey of a quadrangle at that place. Similarly Prof. T. E. Savage finished work on the Canton Quadrangle in Fulton County.

Prof. Stuart Weller completed a very interesting survey along the Mississippi River, Monroe Co., where exposures occur from the Trenton up to and including the coal measures. The region is considerably folded and faulted and has been sufficiently eroded to offer excellent exposures. It is probably the most interesting region so far examined by members of the Survey.

Mr. E. W. Shaw of the U. S. Geological Survey continued co-operative work

in Illinois and surveyed three quadrangles. The work includes the Carlyle Oil Field on which significant information was obtained.

A new map of Illinois will be issued in a few weeks. It is published by the United States and State Geological Surveys in cooperation on a scale of approximately eight miles to the inch, as a unit in the new world map on the millionth scale. As published by the State, it shows drainage, railroads, county and township lines, and the altitude of various towns. It is the first map of the State to show approximately the correct latitude and longitude for all places. It will serve as a base for the new geological map, but meantime will be distributed as a general-purpose map.

Mr. De Wolf has personally been busy with the preparation of manuscript and direction of the work of field men.

EARLY DUTCH IMMIGRATION TO THE UNITED STATES. The following facts illustrate geographical influence upon the selection of new homes. The years 1846 and 1847 saw the founding of prosperous Dutch colonies in our Middle West. The Rev. H. P. Scholte came in advance of a party of 800 Dutch farmers who sailed for this country in 1847, in order to select suitable lands for them. His pamphlet containing the history of this movement has been translated from the Dutch and appears under the title "Coming of the Hollanders to Iowa" (*The Iowa Journal of History and Politics*, The State Historical Society of Iowa, Vol. IX, 1911, pp. 528-574, Iowa City. The colony settled on prairie lands about fifteen miles southwest of Des Moines, Iowa, after Mr. Scholte had visited Michigan where he found nearly all the land covered with timber. He wrote that to the farmer who had spent most of his life in the level hay lands and fields of Holland, the battle with trees and the constant view of stumps in the midst of meadows and cultivated fields would not be agreeable. The virgin forests were cool and there was pleasure in hearing the warble of birds, but the Hollanders would much prefer to buy soils more suitable for farms and easier to cultivate. The Dutch farmers whom he represented were especially eager to possess pastures and milk cows as in Holland and to use plow and harrow on the land and they were not at all inclined to prefer ax to spade or to become dealers in wood.

POPULATION OF CANADA. Press despatches from Ottawa report that the population of the Dominion according to a preliminary statement based on the census of June, 1911, is about 7,150,000. The census of 1901 showed a population of about 5,370,000. The present totals by provinces are, in round numbers: Prince Edward Island, 94,000; Nova Scotia, 462,000; New Brunswick, 352,000; Quebec, 2,000,000; Ontario, 2,520,000; Manitoba, 455,000; Saskatchewan, 454,000; Alberta, 373,000; British Columbia, 363,000; North-West Territories (exclusive of Yukon), 10,000 [?] (20,000 in 1901). These figures represent an increase, in ten years, of 518 per cent. for Alberta, 504 per cent. for Saskatchewan, 203 per cent. for British Columbia and 178 per cent. for Manitoba, and, in five years, of 202 per cent. for Alberta, 177 per cent. for Saskatchewan and 124 per cent. for Manitoba. The population of Montreal is 466,000, and of Toronto 376,000. Winnipeg has grown from 42,000 to 135,000 in a decade.

W. L. G. J.

PROGRESS OF THE GRAND TRUNK PACIFIC R.R. The President of this railroad predicts that it will be completed from the Atlantic to the Pacific in 1914—fully a year earlier than hitherto allowed. From Winnipeg to Edmonton 95 per cent.

of the territory traversed by the line is said to be good wheat-growing, mixed farming land, and for 150 miles west of Edmonton there is excellent land. Great progress has been made with the line running through the clay belt of Northern Ontario, where again on both sides of the line good farming land prevails. The Grand Trunk Pacific will be able to assist materially the movement of the western crop this year, and the company, which has immense elevators at Fort William, expects to carry at least 12,000,000 bushels of wheat to the head of the Great Lakes. Unlike other trans-continental lines which at the outset were content with pioneer lines, which had to be rebuilt as the traffic grew, the Grand Trunk has constructed from the outset a permanent road-bed. (*United Empire*, Vol. II, 1911, p. 660.)

AFRICA

THE HEIGHT OF RUWENZORI. Capt. E. O. Henrici, R.E., communicated a paper at the meeting of the British Association in Portsmouth on the height of this range in Central Africa. The data upon which the computation was based were obtained by Capt. Jack in the course of observations made during geodetic work in Africa. The initial mark with reference to which the heights were determined was the station peg at Lake Albert Station. The position of the highest point of the range was determined as $0^{\circ}23'10''$ N. Lat. and $29^{\circ}52'15''$ E. Long. The calculations give the height of this point as 16,801.3 feet with a probable error of ± 5.3 feet. The height from the best trigonometrical data obtained up to March 1907 was 16,619 feet; height as determined barometrically by the Duke of the Abruzzi, 16,814 feet.

MEMORIAL TO MUNGO PARK AND RICHARD LANDER. It is proposed to erect a memorial to Mungo Park and Richard Lander. A committee has been formed consisting of Lord Curzon, Sir George T. Goldie, Lord Scarbrough, Major Leonard Darwin, Sir Walter Egerton, and Sir Hesketh Ball to take the necessary steps to secure funds for this purpose. Both explorers have been honored in their native towns of Selkirk and Truro, but no record of any kind exists in the land to which their lives were consecrated and sacrificed. In appealing for support, the committee remarks: "As the main object of their travels was to discover where the Niger joined the ocean, the most suitable site would seem to be its principal ocean port. It is therefore proposed to erect an obelisk of similar design and dimensions to Cleopatra's Needle on a projecting point of land at Forcados, Southern Nigeria, where it would both attract general attention and serve as a landmark to vessels approaching the port. The total cost is estimated at £2,000, exclusive of the foundations, which it is understood will be undertaken by the Government of Southern Nigeria." Donations may be sent to the honorary treasurer of the fund, Dr. J. Scott Keltie, 1 Savile Row, London. (*Nature*, Vol. 87, 1911, p. 456.)

CYCLONES, SUGAR CANE AND INSURANCE. The sugar crop of the island of Mauritius is liable to serious injury by the violent tropical cyclones which occasionally reach that locality. In the study of these cyclones, the late Charles Meldrum spent many years of his life, and the results which he obtained contributed very greatly to our knowledge of the "law of storms." In "The Sugar Industry of Mauritius: a Study in Correlation, Including a Scheme of Insurance of the Cane Crop against Damage by Cyclones" (London, 1910), A. Walter has worked out, in minute detail, a formula whence the total effect of the temper-

ature, rainfall and wind upon the sugar crop may be deduced. It is suggested that this formula be used as a basis for determining the loss due to a cyclone, and that it be applied practically for insurance purposes. The crop yield of 1908, predicted by means of the formula, proved correct within 3%.

R. DEC. WARD.

EUROPE

THE GEOGRAPHICAL EXCURSION FROM WALES TO ITALY. The Davis party in West Europe this summer saw peneplains in Devon, Cornwall and Brittany. At the western edge of the Central Plateau Professor Demangeon of Lille showed them fine interlacing land surfaces of the Limousin and Brive cycles, older and younger, above and below, with the plateau of Mil Vaches above, either a more resistant portion or a peneplain fragment of still earlier age. Within the Central Plateau, lava flows of miocene age lay in Limousin valleys and serve to date the cycle. There were also subdued glaciated mountains in Wales to study, and in Cornwall, Devon and Brittany sea coasts that showed signs enough of retreat at first glance but when the question was fairly put—how much?—confessed to but little. Jersey seemed to afford the widest marine bench at Le Hocq, with a width of barely three miles. Then there was endless vulcanism in the Central plateau, more peneplains and a new geographic term in the Morvan. The Jura must be described less simply than was the custom. Crests of anticlines have been planed off in places, as at the Cluse of St. Sulpice, in a way that strongly suggests a surface of an earlier cycle, perhaps the Limousin. In the mountains about Napf were observed singular similarities to Colorado Canyon topography in structural rock terraces along the valley sides, in spite of the climatic contrasts.

The amiability of our guides put us everywhere in touch with the people. The immediate response of building and especially roofing materials to the country rock was very striking, above all in the more modest structures. Pronounced cleavage in the rock yields veritable boards of rock used in building and fencing, alike in the slates of Welsh Bethesda and the schists of Italian-Swiss Biasca. In the Central Plateau where wood was formerly more abundant, a few old houses have roofs of shingles.

As far as the Alps the party enjoyed superb open weather, and the walk up the Hâslital was all the finer for the snow mantle cast on the summits by the rain that closed the week before in the mountains north of the Alps. The weather on the Italian side was impracticable after the first two days. About thirty persons took part in the expedition, ten French, six English, five Germans, two each from Switzerland, Italy and America and one each from Norway, Japan, Serbia and Russian Poland. Among the best known names were Marr, Chisholm, Strahan, Gallois, Glangeaud, Helland, Demangeon, Vacher and Denis.

The party changed somewhat from day to day, never having less than five members and rarely more than ten. Only Professor Davis, Messrs. Praesent and Waldbaur and the writer made the whole journey, which was as enjoyable socially as geographically. An interesting but by no means typical event was a course breakfast on the summit of Puy Sancy just before which Professor Helland was able to inform Professor Davis that the latter had just been honored with the doctorate of the University of Christiania.

MARK JEFFERSON.

LIGHTNING STROKES AND TELEPHONES. In a recent investigation of the question whether or not damage by lightning is increasing in Prussia, K. Langbeck concludes that the decrease which he finds well marked during the past few years in cities is due to the great extension of overhead telephone wires. The removal of the overhead wires into underground conduits will, the author believes, be followed by an increase in lightning damage (*Met. Zeitschrift*, July, 1911).

R. DEC. WARD.

POLAR

DISAPPEARANCE OF THE ANCIENT ICELANDIC COLONY OF GREENLAND. The problem as to what became of the Icelandic colony which disappeared from Greenland in the fifteenth century, the solution of which may be materially advanced by the discovery of European-looking people on the south coast of Victoria Island (69° N. and 115° W.) by V. Stefánsson, as reported in the *Bulletin* for October (Vol. 43, pp. 771-772) is ably dealt with in a paper translated from the Danish and published in the *Deutsche Rundschau für Geographie* (Vol. 33, 1911, pp. 497-507, by Dr. G. Meldorf, late physician of the District of Julianehaab. A comprehensive survey of the literature of the subject and a consideration of all the factors involved lead Dr. Meldorf to conclude that the members of the colony were not massacred by the Eskimos, as sometimes suggested.

He says that for eighty years pirates of the Atlantic (Russian, English and others) put an end to all intercourse between Scandinavia and her colonies. Pirates ravaged the coast towns of Norway between 1393 and 1429, among their exploits being the burning of the port of Bergen and the massacre of its inhabitants. Two generations elapsed before Norwegian vessels again ventured to visit Iceland, Greenland, or even the Faroe and Orkney Islands. Meanwhile, according to Dr. Meldorf's deductions from the information he has collected, European pirates descended upon Greenland, killed many of the colonists and made away with much of their property. He quotes from G. Holm and Daniel Brunn to show that they share his view that although most of the colonists were murdered by pirates a remnant of them escaped to the Eskimos further north, were received into their families and taught the Eskimo arts of hunting and of living without the agriculture which they had practiced in their South Greenland homes; and so, perhaps, some hundreds of these colonists became merged with the natives, introducing a strain of white blood among a section of the Eskimos.

CAPT. BERNIER'S RETURN FROM THE ARCTIC. Capt. Bernier, in command of the Canadian Government steamer *Arctic*, arrived at Quebec on Sept. 29 upon his return from his voyage to the far north. He reached a point within twenty-five miles of the Banks Land entrance to the Northwest Passage, at 74°29' N. lat., 116° W. long. He found the ice conditions so bad that he was unable to attempt to reach the Pacific by that route. The expedition surveyed the 300 miles of unexplored coast from Cape Kater to Fury and Hecla Straits.

MORE NEWS FROM STEFÁNSSON. The American Museum of Natural History has received a letter from Mr. Stefánsson supplementing the information which he sent to this Society in letters dated from Oct. 20, 1910, to Jan. 21, 1911. (*Bull. Oct.*, pp. 771-775). By March last sufficient food had been obtained by Stefánsson and Anderson for the two white men, two Eskimos and seven dogs on their 250 mile journey from the Dease River to Coronation Gulf. Their route lay up

the Dease River Valley, the west end of Dismal Lake and then above the Lake to its east end, thence overland to the Coppermine River and down it to Bloody Falls, whence they crossed overland to the sea near the mouth of Richardson River. They found the ice rough on the Coppermine River and very difficult for sledging. Coronation Gulf was found to contain at least three or four times as many islands as the chart indicated. Driftwood for camp fires was found on the islands, but very little on the main land east of the Coppermine River. In their search for Eskimos the explorers followed the chain of islands eastward, observing the country with field glasses for snow villages. They finally discovered two Eskimo villages near the middle of Coronation Gulf and north of the mouth of Tree River. Each village contained about eighty inhabitants. With the exception of one man who had visited Dismal Lake no person in the village had ever seen a white man. The grandfathers of two of the natives, however, had seen white men or Indians at one time on the lower Coppermine. It was Stefánsson's plan to start late in April to visit all the Eskimos living on the coast of Victoria Land. Dr. Anderson expected to spend the past summer collecting along the shores of Coronation Gulf and Victoria Land and to bring his trophies out by schooner in August.

DR. MAWSON'S ANTARCTIC EXPEDITION. The *Geographical Journal* (October, 1911), says the total contributions of the Australian government to Dr. Mawson's Antarctic Expedition amount to \$110,000. The Royal Geographical Society gave \$10,000. The total funds about Nov. 1 were \$215,000. The expedition was expected to sail for Wilkes Land about Nov. 27.

Dr. Mawson's ship the *Aurora* is 165 feet long, 30 feet broad, with a depth of 18 feet and gross register of 580 tons. She is fitted with a compound engine of 98 nominal horse power and is capable of a speed of nine knots an hour. Under steam she consumes eleven tons of coal a day. For Antarctic sailing purposes her rig has been altered from that of a schooner to that of a barkentine. Her aft has been remodelled to serve the requirements of the large scientific staff she will carry from Hobart. Most of the staff will join the expedition in Australia, the only members that sailed from England on the *Aurora*, besides the ship's officers, being Dr. Mertz, a Swiss zoologist who is an experienced mountaineer, and Lieut. Ninnis who will take part in the survey work. A valuable equipment for magnetic work has been loaned by the Carnegie Institution. The *Aurora* carried from England forty-eight Greenland dogs and a large number of Norwegian built sledges, as well as the bulk of the stores and food supplies for the three parties which it is hoped to land between Cape Adare and the Gaussberg.

PERSONAL

Dr. C. Willard Hayes, Chief Geologist of the U. S. Geological Survey, has retired to engage in technological work in Mexico. He will be succeeded as Chief Geologist by Mr. Waldemar Lindgren who has been connected with the U. S. Geological Survey since 1894. He is author of some fifty Reports published by the Survey.

OBITUARY

DR. DON FLORENTINO AMEGHINO. La Sociedad Científica Argentina announces the death of Dr. Don Florentino Ameghino, Director of the National Museum at Buenos Aires on Aug. 6, 1911.

GENERAL

THE GEOGRAPHICAL CONGRESS POSTPONED. A cable despatch received by the Society on Sept. 23 announced that the Tenth International Geographical Congress which was to have been held in Rome on Oct. 15-22 had been postponed until the spring of 1912. The despatch was signed by the Marquis Raffaele Cappelli, President of the Congress and of the Italian Geographical Society.

EXCURSIONS OF THE GEOGRAPHICAL SOCIETY OF CHICAGO. A feature of the work of this society is the excursions planned for its members by a special committee. In addition to excursions regularly provided by the committee, special excursions of an educational nature are undertaken upon written request of not less than ten members. Among the excursions planned for this fall are those to Warren's Woods, Three Oaks, Michigan, at the height of autumnal coloration; to Rock River, a trip of great interest from the standpoint of scenery and physiography; and two field excursions, one to the dune region of northern Indiana and one to the morainic region in northeastern Illinois.

MAPS FOR AIRSHIPS. In the Geography section of the British Association at its recent meeting a discussion was introduced by Mr. C. Lallemand, President of the French Association for the Advancement of Science, who described the resolutions recently adopted at his suggestion by the permanent Committee for Aerial Navigation of the Public Works Department of the French Government on the subject of the production of an international air map and the establishment of marks required by airmen. Many opinions upon the features to be included and eliminated were expressed, and the importance of cooperation between the cartographer and the airman was emphasized. Mr. Lallemand pointed out that if other countries followed the example of France, international agreements would be necessary to fix conventional signs for the map and other details, and the President of the Section expressed the view that, while much more experiment was necessary before unanimity could be arrived at, there was a tendency to agree on main lines.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

NORTH AMERICA

Yosemite Trails. Camp and Pack Train in the Yosemite Region of the Sierra Nevada. By J. Smeaton Chase. x and 354 pp., map and index. Houghton, Mifflin Company, Boston and New York, 1911. \$2. 8½ x 5½.

The nature-loving public may be divided into two classes, those who have been to the Yosemite Valley and those who have not. To the former Mr. Chase's book will be not only a delightful reminder, but an amazing revelation of what lies hidden from those who have not the seeing eye. As a first visit to the Yosemite marks a crisis in one's life, those who would gain most from the experience should face it with head and heart—awake to the abounding life and loveliness of this Sierra region. Such mental and spiritual alertness is born only of knowledge; it is therefore pages like these that serve to put the prospective traveler on his mettle, as it were, against the unthinking receptive attitude of the ordinary tourist.

Mr. Chase writes with a buoyant intensity of appreciation and an exuberant imagination that cannot fail to strike fire from the duller sensibilities of the best of us. He sees not merely the form and color of flower, rock, and tree, but he individualizes each and discerns its characteristics with unerring insight. Some may take issue with him on the ground that he sees more than Nature put there, but, like the poet he is, he has recognized the instinct that "climbs to a soul in grass and flowers" and has tried to express it. On this account his occasional repetitions may be treated indulgently, not so his historic inaccuracy on page 35. There he says Sequoyah "achieved the feat of reducing the Indian languages to eighty-six syllabic characters." He therefore assumes that Sequoyah reduced *all* the Indian languages, whereas he knew Cherokee only, and made his syllabary to fit that.

The book is divided into two parts. In Part I, which treats of the Yosemite and the Sequoias, the author writes *con amore* of the matchless coniferous forests, perhaps because, as he says, "the forest is not a sight, and the forest frame of mind is not a wide-eyed wondering frame of mind," thus subtly characterizing the attitude of those who "do" the Park on schedule time. Part II describes at length a month's expedition to the lake-land of the High Sierra, the route of which is traced on a fairly clear map. This portion of the book aims to be a guide to almost unknown areas of the locality,—and the details of the outfit and line of march are given with freshness and sincerity of purpose. All of the pictures illustrate the text, and a few are exceptional examples of photographic art.

C. W. HOTCHKISS.

La Paroisse de St. Romuald d'Etchemin, avant et depuis son érection. Par l'abbé Benj. Demers. 396 pp., maps and illustrations. J. A. K. Laflamme, Imprimeur, Quebec, 1906. 8½ x 6.

A worthy contribution to the history of early Canada. The parish of St. Romuald d'Etchemin lies along the southern bank of the St. Lawrence River about four miles to the west of Quebec. In the spring of 1651 a few Frenchmen established a fishery at this place, the first white enterprise there. The book tells what is known of the conditions in this region before white settlement and since that time. The history of this small settlement illustrates the story of French development, the early enterprises of the hardy pioneers who were undaunted amid much suffering and sometimes danger. We have had from Canada few narratives of this kind more graphic, informing and interesting than this.

SOUTH AMERICA

Brazil. By Pierre Denis. Translated and with a Historical Chapter, by Bernard Miall, and a supplementary chapter by Dawson A. Vindin. 382 pp., maps and illustrations. Imported by Charles Scribner's Sons, New York, 1911. \$3. 9 x 6.

The French edition of this work, "*Le Brésil au XXe Siècle*," was reviewed in the *Bulletin* No. 8, pp. 626-628. It is an admirable book, comparable in the solidity of the author's insight and the adequacy of its treatment to Bryce's *American Commonwealth*. If it has a certain lack of unity so has Brazil, even politically and socially. The nearest thing to a physical unit is the great plateau near the Atlantic coast, low and terribly affected with drought at Ceara in the north, but a half mile above sea in the south and well watered. Here it breaks down to the sea in the granitic Serra do Mar of São Paulo, to the prairies of Rio Grande in the basalt cliffs of the Serra Geral. These southern cliffs hang over the tropical lowland between Espiritu Santo and Rio Grande, which man has crossed but never settled. On these cliffs the rains are all too heavy. There hangs a tropic forest as typical as in the basin of the Amazon. Above, the plateau is drier and to the summer is given an intensity among the seasons by the distance from the equator that combines with the dryness of the winter to make São Paulo the finest coffee country in the world. The short period of heat causes all the berries to ripen at once so that here alone can the whole crop be gathered in a single picking, and dry harvest time facilitates the curing of the berry. The best soils are the red earths that result from the decomposition of sheets of basalt.

Here the Paulist landowner holds patriarchal sway over huge estates. A million Italians cultivate the soil without attachment to it, for, with minor exceptions, they can buy no land. They migrate much, at times to the Argentine or back to Europe. A highly protective government brought them at its own expense, protects them fairly from abuse and caps its assistance to the land-owning class by the "valorisation" attempt of 1907, when it bought 8,000,000 sacks of the best coffee to hold for release in worse seasons, having forbidden the extension of the plantations, for overproduction has made the São Paulo problem mainly one of salvation from disaster.

Perhaps more hopeful for Brazil is the government colonization of Paraná, Santa Catharina and Rio Grande. Here is a new democracy of European small proprietors strongly contrasted with the three-century-old Paulist aristocracy,

for it is permanent and growing in prosperity, contentment and numbers. Their task has been hard. They have been sturdily winning from the soil an abundant sustenance that was not wealth for lack of means of communication and exchange. The railroad is solving their problem and transforming their condition. The danger of Germanization here or of Italianization in São Paulo is non-existent. Prosperity removes the very appearance of foreign solidarity.

The hopeless negro masses, the half-breeds of Ceara, wretched in their droughty land, but multiplying amazingly and peopling the Amazon with its scattered rubber gatherers, Brazilian economy and politics are all studied and described. The translator's work is excellent apart from his historical preface. The book has the advantage of maps and illustrations lacking to the French edition and useful if not cohering closely with the text. It will become the standard work on Brazil.

MARK JEFFERSON.

AFRICA

Khont-Hon-Nofer. The Lands of Ethiopia. By H. K. W. Kumm, Ph. D. xi and 282 pp., map and illustrations, bibliography and index. Marshall Brothers, Ltd., London, 1910. 6s. 9 x 5½.

This is the second book by the author on his journey across the Sudan. The first one "From Hausaland to Egypt" (*Bulletin*, XLIII, 535, July, 1911), gives an account of the journey, and while the author does not conceal the fact that the main object of his travels is in the interest of missions, the book is largely an explorer's story. The ethical and religious conclusions of the explorer have been collected in this second book which is dedicated largely to the missionary movement. After reviewing briefly and somewhat sketchily the journey reported in "From Hausaland to Egypt" the author turns to the discussion of the status of the Sudan in modern missions. The history of Mohammedanism, including an account of the rise of the most virile of its branches, Senussiism, is a cumulative warning against the spread of this religion. Then follow chapters on Heathenism in the Sudan, History of Missions in the Sudan, The Success or Otherwise of Missions in Central Africa, Missionary Politics and Strategic Points of the Sudan from the standpoint of the battle against Mohammedanism and Paganism. The discussion covers a great deal of ground and the author has placed in this volume the conclusions which he has derived not only from this trip across Africa, but also from extensive observations in many lands. The condition of the borderland between Mohammedanism and Paganism is clearly described, and the call to battle is a strong one. The book will probably fulfil its intention and stir into action a larger and more united body of workers in this field.

As accessories to the main part of the book are some valuable aids which include besides a number of photographs, a map, a well-considered index and a list of the missionaries in the Sudan, an extensive bibliography of the Sudan containing more than 600 titles, arranged alphabetically by authors.

R. M. BROWN.

Living Speech in Central and South Africa. An Essay Introductory to the Bantu Family of Languages. By A. C. Madan, M.A. 95 pp. Clarendon Press, Oxford, 1911. \$2. 9 x 6.

This is an unexpected contribution to the growing literature of the new philology. No question of priority is at all likely to arise for consideration by

the few zealous students who are doing pioneer discovery work in the new task of adjusting the study of speech to the history of the evolution of man. Yet it is interesting to note that while Mr. Madan has investigated his Bantu theme independently and without any apparent acquaintance with the literature of the new philology, his method was fully detailed by an American student at least five years before the date of the present volume; and in so characteristic a detail as his employment of the seed as representing a more primitive speech unit than the root he will find himself anteceded. He is dealing with the great agglutinative speech family of Africa, and on *a priori* grounds the method of research must be difficult of application, for the language represents an advanced stage in which the maximum reducibility must be to the next inferior type, the isolating. It is because of the action of this principle that the reduction of the inflected languages leads no further than to a source in agglutination. Thus, in carrying out his idea Mr. Madan is led to establish the seed of speech in the consonant structure of the Bantu to which the vowels are applicable with coefficient value as modulants. In the American work upon the great isolating speech of Polynesia the same method of investigation and the same principles of research led to the establishment of the seed of speech in the vowel to which the consonants, as their use is acquired by training of the buccal speech organs, are applied with coefficient value. Inasmuch as the vocal use of the open throat is common to beasts and men, both using vowels; and the consonant is a possession of man alone, save as the appulse of certain animal cries may be interpreted as a movement toward consonant formation; it will be seen that if the ultimate seed of the Bantu speech is the consonant the investigation is barred from approach to the stage where the cry was becoming differentiated into speech. Nevertheless the work will be warmly welcomed as indicating the spread of interest in this newly discovered science of speech.

WILLIAM CHURCHILL.

Report of a Magnetic Survey of South Africa. By J. C. Beattie. ix and 235 pp., maps, charts, and index. Published for The Royal Society, and sold by the Cambridge University Press, London, 1909. 22s. net. 12 x 9½.

Gives the results of the magnetic survey of South Africa, the observations for which extended from 1898 to 1906. The reduction of the astronomical observations was carried out by Dr. Beattie and Mr. V. A. Löwinger. The region surveyed extends from L'Agulhas on the south to Victoria Falls on the north and from Saldanha Bay on the west to Beira on the east. More than 400 stations were occupied.

Wild und Wilde im Herzen Afrikas. Zwölf Jahre Jagd- und Forschungsreisen. Von Hans Schomburgk. Mit einer Kartenbeilage, 8 Voll- und 103 Textbildern nach Originalaufnahmen von Hans Schomburgk und J. McNeil und einem Vorwort von Carl Hagenbeck. xiv and 373 pp. and index. Egon Fleischel & Co., Berlin, 1910. M. 8. 9½ x 6½.

The author has here recorded the results of twelve years hunting in Central Africa, chiefly in German East Africa and in the British regions to the north of the Zambesi River. He lived a long time in the country of the Mashukulumbwe and the many pages he gives to his life and adventures in their land show that conditions there have wonderfully improved since they attacked and

utterly despoiled the expedition of the late Dr. Holub who lost everything he possessed and nearly perished during his retreat out of this inhospitable country. This is one of the best hunting books relating to Africa that has yet been published. The larger part of the photo-engravings are pictures of the game killed.

A Guide to the Antiquities of Upper Egypt from Abydos to the Sudan Frontier. By Arthur E. P. Weigall. xxiii and 594 pp., maps, plans, and index. The Macmillan Company, New York, 1910. \$2.50. 7½ x 5½.

This volume cannot fail to be most useful to those who visit the monuments of Upper Egypt. The author, an authority on his subject, is Inspector General of Upper Egypt for the Department of Antiquities, Egyptian Government. Each chapter in the guide book was written in, or in a few cases, only a short distance from the temples or tombs which he describes. The information is derived from prolonged personal observation and is checked by study of the few books relating to the monuments in Upper Egypt. The antiquities he describes are situated between Balianeh, the southernmost town of Middle Egypt and Adendân, the last Egyptian village north of the Anglo-Egyptian Sudan. The book is confined to a description of the ancient remains, an explanation of their purpose, with the addition of some hints as to the best methods of visiting the various sites.

Dans le Sud-Africain et au seuil de l'Afrique Centrale. Par Alfred Bertrand. 71 pp. and 58 illustrations. Librairie J. H. Jeheber, Geneva, 1911. 4 Fr. 8½ x 5½.

A short account of the present aspects of Basutoland, East Griqualand, the country of the Barotsi in the Zambesi Valley and a summary of the results of missionary work in these regions. Though a short sketch, it gives a good idea of present conditions in these parts of South Africa and of the important development that has been attained.

Zur Geologie und Hydrologie von Daressalam und Tanga (Deutsch-Ostafrika). Von W. Koert und F. Tornau. 77 pp., maps and illustrations. Abhandlung der Königlich Preussischen Geologischen Landesanstalt, Neue Folge, Heft 63. Berlin, 1910. M. 7.50. 10 x 7.

This report is based on investigations undertaken in 1902-1905 with a view to furnishing Daressalam and Tanga with an adequate water-supply system. Daressalam is at the same time the chief port of German East Africa and the terminus of the important, and rapidly extending railroad into its interior, while Tanga occupies a like strategic position with reference to the fertile district of Usambara. The report is divided into two parts. The first deals in two chapters with the geology and the hydrology of Daressalam, to which is appended a list of the geologic horizons met with in the various bore holes that were drilled. The second part deals in one chapter with the geology and hydrology of Tanga. The report is accompanied by sketch maps of Daressalam and Tanga, showing the location of the drill-holes, by geological profiles of the territory immediately adjacent to Daressalam and by numerous excellent illustrations from photographs taken by Prof. Uhlig. The report is representative of the detailed systematic work being done in the German colonies.

W. L. G. J.

Die Masai. Ethnographische Monographie eines ostafrikanischen Semiten-volkes. Von M. Merker. xxxi und 456 pp., 89 Figuren, 6 Tafeln, 62 Abbildungen und einer Übersichtskarte. Zweite verbesserte und vermehrte Auflage. Dietrich Reimer (Ernst Vohsen), Berlin, 1910. Mk. 12. 11 x 8.

This second edition, enlarged and even improved, is a fitting memorial to one of the most truly inspired investigators that ever a primitive people has had. In the first edition it was clear that Captain Merker not only knew about the Masai but that he knew the Masai in the life they led. In the five years which elapsed between the first edition and this later production the reading public had advanced to a point where knowledge of the Masai was eagerly sought.

The first edition of this work had been exhausted in three years and there was demand for something yet more complete. In his arduous duties in the Masai highlands Merker renewed his zeal, he found time, or made it, to plan the recasting of the former work with the addition of the store of material which he had newly acquired. Death in that fever-bitten land is never unexpected, but it came suddenly to this busy administrator and scholar. His notes, however, were in such orderly form that it has been possible for his two editors and friends to insert them in their proper places and thus to produce a new work which is abundantly representative of the plans of its author. It is ethnography of the best sort, it is written throughout from the outward glance of the man who practises each of the arts, who follows in his own intelligence each of the customs here so appreciatively recorded. Because the Masai, a nomad people within a wide range, are a Semitic folk, their ethnography has an appeal to the general reader far greater than would be the similar study of any other people of Africa. The condition of their life has been such that they tend to conserve the most archaic customs of the other wandering Semites. They are, therefore, most illuminative of the primitive beliefs of the people whose similar customs have undergone evolution from rigid monotheism into a mystery of triune monotheism which has become numerically one of the greatest of world religions though humblest in its beginning.

WILLIAM CHURCHILL.

Nigeria and Its Tin Fields. By Albert F. Calvert. xvi and 188 pp., maps and illustrations. Edward Stanford, London, 1910. 3s. 6d. 7½ x 5.

This volume is a pioneer book on the development of tin in this English protectorate and, in the main, it is a prospectus of the properties. In Part I the early days in northern Nigeria, development by steamship lines and by the Niger Company, the beginning of tin washing and the discovery of the Bauchi tin wealth are briefly treated; next, the reports on the development of the tin industry and working the mines are discussed, together with the geological report, analysis of the tinstone concentrates, expert reports, possibilities of transport, topography and climate of the Bauchi province, and the question of labor. An examination of the commercial and political outlook follows. The tin deposits are scattered over 2,500 square miles and the tin is considered better than the Straits' tin. The Bauchi province is over 3,500 feet above sea level, is hundreds of miles from malarial swamps and is a healthful and fertile district. The chief drawback is the inaccessibility of the field and the difficulties of transportation. The author discusses the cost of transport and enumerates the railroad lines of Nigeria. The Government is said to be projecting a line from the Baro-Kano railroad to the center of the tin district, about 125 miles.

Part II is headed "Particulars of Companies working tin properties in Northern Nigeria." In this section, twenty or more companies are listed, each report being in the form of a prospectus, showing capital invested, naming directors and describing the areas under the control of the various companies. Part III is a copy of the new mining regulations for Northern Nigeria. At the end of the book and comprising about two-fifths of it, are pictures and plates. Among them are 234 photographs, mostly of scenes throughout Nigeria, four maps which show Southern Nigeria, Northern Nigeria and the railroad routes, and 21 plans of the different tin fields. The book also gives much general information concerning the protectorate.

R. M. BROWN.

ASIA

The Call of the Snowy Hispar. A Narrative of Exploration and Mountaineering on the Northern Frontier of India. By William Hunter Workman, M.A., M.D., and Fanny Bullock Workman. With an Appendix by Count Dr. Cesare Calciati and Dr. Mathias Koncza. xvi and 288 pp., maps, illustrations, and index. Charles Scribner's Sons, New York, 1911. $9\frac{1}{2} \times 6\frac{1}{2}$.

This book is another memorial to the enormous labors of the Workmans in the exploration of the higher Himalayas. The special objective of the expedition of 1908 was the investigation of the Hispar glacier and its tributaries. During previous expeditions the glacier had been seen and the border region had been explored to some extent so that the locality was not altogether a strange one to the explorers. The expedition left Srinagar late in May and early in June was at Hispar, near the lower terminus of the great glacier, by the middle of August reached the head of the Hispar ice field at Hispar Pass, a point which had been attained in a previous expedition, and entered Srinagar again in October.

The book is a story of every detail of the journey, including the equipment, the problem of coolie transport and the arrangement for the commissariat service as well as the accounts of marches and attainments. The absorbing chapters of the book are IV and VII. In the former, the ascent of Triple Cornice Peak, 19,000 feet, by the way of the Haigatum tributary of the Hispar glacier, accompanied by all the dangers of snow-capped mountain peaks, is described, and what words fail to tell of this accomplishment is shown in well selected photographs. Chapter VII is the climax of the book in that it tells of the ascent of the Biafo-Hispar Watershed Peak, 21,350 feet. From a camp 19,100 feet high on the flank of the Peak, two parties set out, Dr. Workman with one porter to visit the lower summit and Mrs. Workman with three assistants to ascend the main peak. Mrs. Workman's feat in reaching the summit along an arête, sharp and long, was magnificent in that it was successful. Much space is given to the troubles with the coolies and this is justified for the reason "that the province of the explorer is, among other things, to chronicle for the benefit of others the ethnological peculiarities of the inhabitants as well as the features of the regions he investigates." Like the other books of travel written by the Workmans, this book is beautifully illustrated with an abundance of photographs, some of them telephotographs and others panoramic views, which are carefully selected to explain various phases of the journey. An appendix by two trained surveyors gives us a scientific account of the glacier and its tributaries and adds great value to the volume. The map which is the result of their survey is excellent in itself and as a guide to the reader.

It is a far cry from the Karakoram to the Andes, from magnificent accomplishments to a contentious spirit. The newspaper controversy between Mrs. Workman and Miss Peck has not been pleasant reading, and it is a grave mistake to add as the final chapter of the account of this praiseworthy exploration of the Hispar glacier the report of the expedition sent by Mrs. Workman to Peru which showed "that the altitude of the lower summit of Huascaran, claimed to have been ascended by Miss Peck, is some 1,500 feet lower than the highest altitude attained by Mrs. Bullock Workman."

R. M. BROWN.

Siberia. A Record of Travel, Climbing, and Exploration. By Samuel Turner, F.R.G.S. With an Introduction by Baron Heyking. 320 pp. with 46 illustrations. Charles Scribner's Sons, New York, 1911. 8 x 5½.

A reprint of a good book written largely from a business man's point of view, but also rendering some geographical service in a neglected part of Siberia, which was reviewed in the *Bulletin*, Vol. 38, 1906, p. 259.

Cyzicus. Being some Account of the History and Antiquities of that City, and of the District Adjacent to it, with the Towns of Apollonia ad Rhyndacum, Miletupolis, Hadrianotheræ, Priapus, Zeleia, etc. By F. W. Hasluck. xii and 326 pp., 24 illustrations, 3 maps, appendices, bibliography and index. Cambridge: University Press, 1910. \$3.50. 8½ x 5½.

The first part of the work deals with the topography of the Cyzicus district, the archæological work that has been done there and the history of the townships around Cyzicus. The endeavor is made to show ancient and modern conditions side by side. A separate chapter is given to the discussion of the road system. The second part treats of the history of Cyzicus. The chief purpose of this careful work is to correlate the available information and put it into convenient form for the use of future archæological workers in this part of Asia Minor.

The Veddæ. By C. G. Seligmann, M.D., and Brenda Z. Seligmann. With a Chapter by C. S. Myers, M.D., D.Sc., and an Appendix by A. Mendis Gunasekara, Mudaliar. xix and 463 pp., illustrations, maps and index. University Press, Cambridge, 1911. \$5. 8½ x 6.

Students of the primitive must feel an interest in the Veddæ of Ceylon because they are probably the sole survivors of the lowest scale of social organization. This volume contains the result of the minute examination of this rude folk made by Dr. and Mrs. Seligmann. They have been very painstaking in their research, every note is accompanied with full description of the conditions under which the observation was made. It is excessive straining after accuracy. Just one sample will suffice. On page 50 we find, "these men came up to one of us (C. G. S.), shook hands" and "she tried to feed one of us (B. Z. S.) with yams." By such contrivances it has been possible to make stupid a theme which in itself has a thrill. It is probable that the interested inquirer will read the brilliant work of the brothers Sarasin for the life-story of the Veddæ and will turn to this volume for the hard facts. While the manner of presentation is open to serious objection the work is undoubtedly very valuable. The Veddæ are undergoing rapid absorption into the surrounding Sinhalese population and there may be no opportunity to subject them to such study as has been bestowed upon them by these observers. This is a storehouse of facts which will stand as the authority for the work of more inspired students. WILLIAM CHURCHILL.

Aus dem Märchenlande von 1001 Nacht. Beobachtungen und Abenteuer eines Geologen in nördlichen Persien. 1. Band. Von Hans Pohl. xii and 208 pp., illustrations and index. Verlag von Gustav Körner, Leipzig. Mk. 2. 8 x 5½.

The author is Professor of Geology in the University of Bonn. His visit to northwestern Persia was largely to study its geology. He found, upon returning home, that most of his scientific results and many observations of a general nature, had not yet appeared in literature relating to this region. His route was from the Russian Black Sea Port of Novorossinsk (ice free the year around) to Batumi; thence to Tiflis, the capital of Trans-Caucasia, thence southward by rail to Erivan and then to Mt. Ararat on the boundary between Trans-Caucasia and the extreme northwest of Persia. He traveled southward to Chai and Tabriz and to the latter city he gives the two concluding chapters of the first volume. The book is a general description of his journey, with geological notes along the way, but in this popular account, geology is not more prominently presented than geographical description and characterization of the peoples, their life, well-being, industries, etc. The author comments only on things that are well worth while. It is a very readable and informing book.

Religion und Kultur der Chinesen. Von Wilhelm Grube. vii and 220 pp., and illustrations. Verlag von Rudolf Haupt, Leipzig, 1910. M. 3.

This is a posthumous work and one which makes us sorry that we shall have no more contributions by the author on the subject. He places special emphasis on the fact that, of all ancient civilisations, that of China is, although the most remote, the only one that has survived to this day, in its ancient form. Whatever changes have taken place in China since the oldest times are insignificant in comparison with the astonishing stability of its conditions in general: language and religion, public and domestic life, habits and customs, as we find them illustrated in its uninterrupted historical traditions whose authenticity has been proven as far back as 841 B. C. The geographical isolation of the country is the paramount cause of this astonishing conservatism. Throughout her history China came in contact with only those peoples whose civilisations were inferior to her own. They could not teach her anything, and gave her no competition which would have stimulated progress.

As a compendium of what every student of China ought to know about its religion and cult, no better book than this can be imagined. M. K. GENTHE.

L'Indochine française. Par Henri Russier et Henri Brenier. 356 pp., avec 56 Gravures dans le texte et 4 Cartes hors texte en couleur. Librairie Armand Colin, Paris, 1911. Fr. 4. 7½ x 4½.

In two years this work has passed from a text book of local geography designed for use in the secondary schools of Hanoi in teaching the Indo-Chinese, and this second edition embraces the wider scope of a valuable geographical compendium of the Asiatic possessions of France. How great that colony is may best be shown by comparison with the metropolis; the sum of the areas of the five lands of the peninsula, Tonkin, Annam, Cochin China, Cambodia and Laos, falls little short of being half as large again as France. Nor is area the only criterion; despite the expenses of the earlier wars of conquest this colony has come into economic importance, the only French colony which is by way

of showing itself profitable to the business community at home, for in the fifteen years for which statistics have been compiled the total exterior commerce has leaped from \$34,000,000 in 1892 to \$98,700,000 in 1908.

More than half of this commerce passes through the port of Saigon, the administrative center, a city which with the inclusion of its overgrown suburb of Cholon has a population of 250,000. The text is brilliantly illustrated, though the good half-tone cuts have received scant justice on the press through neglect of overlays, but the four charts are in better case and are wholly free from the minute pettiness with which so many geographers obscure the salient detail which it is their aim to present. In the chapter dealing with the population of this area the authors have acted wisely in omitting the controversial matter; their account represents the fair mean of that which is most generally accepted, and the disputes are better left to the journals of ethnography. In some glorified and radiant hereafter it may perhaps be hoped that the French will discover the value of the index.

WILLIAM CHURCHILL.

The West in the East from An American Point of View. By Price Collier. ix and 534 pp. Charles Scribner's Sons, New York, 1911. \$1.50. 8 x 5 $\frac{1}{4}$.

Mr. Collier had a good time in his discovery of Asia, principally in India, for no more than three chapters deal with his traffic with China, Japan and Korea. His narrative is bright, frequently witty, quite as frequently what the English designate "not wholly nice." He deprecates the idea that the ages old Orient can be learned within the travel span of the most interested observer, he depreciates the work of others whom he considers to have offended in that particular; yet he shows no diffidence in solving the most intricate of problems, that racial problem which the centuries have never been able to settle, the problem of the terms on which the whiteskin is to live with the more highly pigmented epidermis. Furthermore, when with a cheap fling at Boston one drops just once into Greek and quotes Pindar's "navel of earth," it is just as well to remember that the Boston at which he jeers can probably spell its Greek correctly, can put the accent on its proper syllable and does not normally write the accent before the *spiritus lenis*, a record of three mistakes in one word. When he passes beyond the province of American English he fares scarcely better. He cites the horse as a "whaler" when the briefest inquiry would have taught him that the name arises from the place of breeding in New South Wales. His pronouns lead him into messes that might easily have been avoided. In his description of a morning ride in India he writes "my tent measures so-and-so — your clothes are laid out, the hot bath is ready." Yet even in the East the best folk take their own baths and are quite careful to wear their own clothes. Those who have given toilsome years to the effort to comprehend an alien culture which always presents some new and unexpected complication are by now reconciled to the books of passing voyagers, but when they think of the effect which such work has upon those at home who comprehend so little of the tragedy at the edges of life they welcome each new book none the more cordially. And the greatest harm is done by the books which are as readable as this.

WILLIAM CHURCHILL.

EUROPE

La Belgique moderne. Terre d'Expériences. Par Henri Charriaux. 390 pp. Ernest Flammarion, Éditeur, Paris, 1910. Fr. 3.50. 7 x 4½.

One of the illuminative and interesting studies of countries of which the house of Ernest Flammarion has published a considerable number. It is only in small part a geographical study. It treats of Belgium in relation to its languages, provincial and communal life, education, political tendencies, the system of land holdings, co-operative enterprises, labor, commerce, etc. In brief, it is the study of a people, their social development, and the influence of their institutions upon them.

Beiträge zur Kenntnis der Höhengrenzen der Vegetation im Mittelmeergebiete. Von Dr. Max Koch. x and 310 pp., bibliography and diagrams. Druck und Verlag C. A. Kaemmerer & Co., Halle a. S., 1910. 9 x 5½.

The results of this study were accepted as a dissertation by the philosophical faculty of the University of Halle. Considerable attention is given to the position of the snow line in various parts of the regions under consideration, and the upper limits of the growth of a large number of plants are given.

Old Country Inns of England. By Henry P. Maskell and Edward W. Gregory. ix and 294 pp., illustrations and index. L. C. Page & Company, Boston, 1911. 8 x 5½.

This topic has never been fully treated. The book gives a classification and description of the old inns which sheltered the English forefathers before the days of rapid transit and served as their usual place for meeting and relaxation. Interwoven with the story of these inns is much of the history of times and manners in the days when they were most important. Many of the old inns are now gone, for few flourished after the railroad succeeded the coaching system. In provincial towns and hamlets, however, there is still a large number of small inns. Among the nineteen chapter headings are "Manorial Inns," "Monastic Inns," "Coaching Inns," "Historic Signs and Historic Inns," "The Inns of Literature and Art," "Haunted Inns," and "Old Inns and their Architecture."

Bathymetrical Survey of the Scottish Fresh-Water Lochs. Conducted under the direction of Sir John Murray and Laurence Pullar during the years 1897 to 1909. Report on the Scientific Results. Vol. I, 785 pp., map, illustrations, bibliography and index; Vol. II, 281 pp., and illustrations; Vols. III-VI, plates. Challenger Office, Edinburgh, 1910. £5 5s. 9½ x 6½.

This great work has been everywhere accepted as the largest and most important contribution to limnology yet made. Much of the material was published in the *Geographical Journal* and the *Scottish Geographical Magazine* before its appearance in book form. The work records the investigation into the bathymetry of the fresh-water lochs or lakes of Scotland between 1897 and 1909. The larger part of the survey was given to the determination of the depths of the lakes and of the forms of their basins. A great many observations, however, were carried out in other branches of limnography. Vol. I, mostly new matter, includes many articles dealing with the results of these studies from the topographical, geological, physical, chemical and biological points of

view. Various theoretical considerations are also advanced, and the Scottish lakes are compared with lakes in other parts of the world. The volume concludes with an exhaustive bibliography of limnological literature which will be invaluable to students of this subject. The special descriptions of the lakes appear in Vol. II, and the maps of them fill the four other volumes. Throughout the text are many maps showing the drainage areas of the districts in which the lakes are situated. All the survey maps were prepared and printed by the Bartholomew map house and are very fine specimens of cartography. Science is much indebted to Sir John Murray and Mr. Laurence Pullar for planning and carrying out this great work of research.

The High-Roads of the Alps. A Motoring Guide to One Hundred Mountain Passes. By Charles L. Freeston, F.R.G.S. Second Edition Revised and Enlarged. xvii and 392 pp., with 110 itineraries, 102 photographic illustrations and 11 maps and diagrams and index. Charles Scribner's Sons, New York, 1911. 8½ x 5½.

An improved edition of this excellent book which was reviewed in the May *Bulletin*, pp. 381-382.

La Vie Politique Orientale en 1909. Par Dr. Georges Samné and Y. M. Goblet. xi and 317 pp., and appendices. Editions de la "Correspondance D'Orient," Paris, 1910. Fr. 6. 9 x 5½.

A careful review of political and social conditions in Turkey, the Baltic Peninsula and Morocco.* Among the subjects discussed are the Balkan crisis of 1908, Turkey under constitutional government (to which a third of the book is given), affairs in Greece, the Persian Revolution, Egyptian questions and the events of the past two years in Morocco. A chronology of thirty-two pages summarizes the recent history of these countries.

Die Flüsse Deutschlands. Von Ed. Gennerich. Unter Benutzung der von Herrn Geheimrat Keller bearbeiteten Stromwerke. Sonderabdruck aus der *Zeitschrift für Gewässerkunde*, Bd. VIII, Hefte 3 u. 4. 168 pp., Verlag u. Druck von Wilhelm Baensch, Dresden, 1908.

The small volume is an attempt to condense, and make accessible to a wider circle of readers, the contents of the famous standard monographs on the Rivers of Germany. It contains the volumes at low, medium, and high water of each of the more important rivers: Rhine, Ems, Weser, Elbe, Oder, Vistula, Pregel, Memel, and explains their relation to the size, rainfall, soil, vegetation, climate, of the respective drainage areas, together with the grade, average width, and navigation, of the principal inland waterways of Germany. It will be a welcome addition to the reference library of the potamo-geographer who cannot afford to consult the bulky original monographs.

M. K. GENTHE.

PHYSICAL GEOGRAPHY

Characteristics of Existing Glaciers. By William Herbert Hobbs. xxiv and 301 pp., maps, illustrations, and index. The Macmillan Company. New York, 1911. \$3.25. 9 x 6.

Scholars in great libraries do not always recognize their responsibility to use their books. This Professor Hobbs has done. He has made a wide survey

of the scattered sources and gathered here an extremely interesting collection of maps, pictures and observations on glaciers and snow fields of all kinds. Surely all students of earth science will thank him for this work and the ample references.

He divides his subject into Mountain Glaciers, Arctic Glaciers and Antarctic Glaciers. In the first he proposes a much-increased attention to cirque formation as the dominant process at high levels. He objects to the name Valley Glaciers because they rarely get far into their valley, lying mostly within the "mother cirque" (p. 52). He would call them rather Radial (Alpine), the second of which names is not new. His classification of Mountain Glaciers under fifteen heads seems to hang together badly. Decreasing snow alimentation is the criterion and it governs 2, 3, 5, 6, 14 and 15 very well if the other nine are omitted.

The large collection of data concerning polar glaciers is of very great value. It is good reading, though so hastily written in places as to be puzzling. Through it runs the thread of a discovery that Professor Hobbs has made about the winds and pressures near the poles. "Unfortunately the theory of polar eddies promulgated by Ferrel and adopted by Davis in his, in many respects, excellent treatise is responsible for a general prevalence of incorrect views concerning the winds of both the earth's polar regions" (p. 265). The 'discovery' is that a local "fixed anticyclone" exists on Greenland and Antarctic, causing outward winds in every direction. So far the discovery is reconcilable with Davis's treatise on meteorology (see p. 231). But Prof. Hobbs holds that the snowfall nourishes the ice sheets by the descent of cirrus ice grains from heights of 14,000 to 25,000 feet down upon the surface, as the cold, heavy, lower air slips off down the slopes of the ice dome. These grains "are melted and vaporized by adiabatic warming and on reaching the cold surface layer of air next the ice are quickly congealed to form flakes of snow" (p. 287). The process is finally checked by too much adiabatic heating, which softens the snow and makes it sticky. Then a long calm allows the heat to radiate away again.

A somewhat headlong seeking for evidence of this process and an ignoring of obvious difficulties mar a very interesting volume, but it remains still a volume of value and interest.

MARK JEFFERSON.

Handbuch der Klimatologie. Von Dr. Julius Hann, Professor an der Universität Wien. Band III. Klimatographie. II. Teil. Klima der Gemäßigten Zonen und der Polarzonen. Dritte, wesentlich umgearbeitete und vermehrte Auflage. ix and 713 pp. J. Engelhorn's Nachf. Stuttgart, 1911. 23 marks unbound. 9 x 6½.

No discerning person can look through the final volume of the third edition of Hann's magnificent work without being impressed by the author's absolute mastery of his subject. In these days of the rapid growth of scientific literature, whoever, as a recognized authority, critically summarizes this literature, and thereby makes it accessible to his colleagues, is doing an important work. Hann has, for these many years, been rendering just this kind of invaluable service to all who have been trying to keep up with the rapidly-increasing flood of meteorological and climatological literature. We say "trying to keep up," for it is safe to assert that there is but one man in the world who really succeeds in keeping up. And that one man is Hann. No one who has not made a

serious effort to keep abreast of this literature can appreciate what it means to be the master of it. Yet Hann is much more than a compiler for others, important as that function is acknowledged to be. He does not merely give us a well-digested and readable summary. He is not content with presenting the work of others just as they left it. When published climatological data need revision, correction, reduction, in order to make them scientifically valuable. He carries out that revision. He gives us better, and more, than do many of the original authorities from whom he has collected his data. In addition, his own original researches, covering a very wide range of subjects in meteorology and climatology, carried on for years with marvelous patience and skill, make every page of his published works a store-house of exact and authoritative information.

All who are in any way concerned with the science of the earth's atmosphere will unite in extending their hearty congratulations to the veteran author upon the completion of this work. The volume deals with the climatology of the temperate and polar zones, the second having taken up the tropics. It is absolutely "up to date." Following an excellent custom, the author has noted, at the end of the Appendix, "geschlossen Mai 1911." Thus anyone who wishes to look up any subject on which he needs the latest data, knows exactly where Hann left off, and where he must begin. The final proof was read in May, and the printed volume was in the present reviewer's hands by the middle of July. There are references in the Appendix to articles which appeared in April, 1911. The one great fact which impresses itself upon the reader of this volume is the tremendously wide range of the author's reading, and his remarkable power of assimilation. Nothing seems to have escaped his watchful eyes, or to have been an excessive burden upon his unfailing memory.

It may seem to many that "dry climatological data" cannot possibly be made interesting. Yet our author, by his vivid descriptions of weather types; by his frequent reference to the effects of climate upon vegetation, upon crop distribution and upon human activities; and by his well-chosen quotations (*e. g.*, Midden-dorff's remarkably vivid description of the Siberian winter cold), has succeeded admirably in giving us a book which is far from being "hard reading." Many general readers will find much to interest them as, for example, the discussion of the winter climates of the Mediterranean health resorts; of possible climatic changes in Palestine; the description of the weather conditions experienced; and the excellent account of the general characteristics of polar climate, in which are embodied the Nansen-Mohn isothermal and isobaric charts of the north polar area. Our increasing interest in South America gives special interest to the admirable account of the extra-tropical climates of that continent, in which are included such recent publications as those of W. G. Davis on the climate of Argentina (1910), and the several noteworthy papers, of anthropogeographic interest, recently published by Prof. Isaiah Bowman, of Yale.

The section on the United States, of nearly 100 pages, is especially worthy of attention. Without detracting in any way from the importance of Prof. A. J. Henry's "Climatology of the United States" (*Bulletin Q*, Weather Bureau), to which Hann acknowledges that he is indebted for much of his information, it may be said that there has been no general recent account of the climates of the United States as good as that contained in this volume. *Bulletin Q* was, of course, intended as a climatological dictionary, rather than as a connected and concise description and analysis of climate. The criticisms which our author makes of the published temperature data for the United States and of the lack

of strictly comparable mean temperatures are justified (Hann has himself reduced some of the temperatures to the 33-year mean), and we are glad to note his appreciation and commendation of the new climatological summaries, by sections. We are especially glad to note the retention, from earlier editions, of Lorin Blodget's description of the general characteristics of the United States climates east of the 100th meridian. Blodget's "Climatology of the United States" is a classic, although almost unknown to the younger generation of meteorologists. Indeed there is much of real climatological interest and value in many of the older accounts of North American travel and exploration, as *e. g.*, in the *Journals* of the Lewis and Clark Expedition. Dr. Fassig's excellent report on the climate and weather, of Baltimore receives well-deserved commendation.

R. DEC. WARD.

ECONOMIC GEOGRAPHY

Der Pflanzenbau in den Tropen und Subtropen. Von Professor Dr. Max Fesca. Dritter Band. xiv and 361 pp. Verlag von Wilhelm Süsserott, Berlin. 1911. 8½ x 5½.

The concluding volume of Prof. Dr. Fesca's valuable work on economic plants in tropical and sub-tropical regions. The present volume includes citrus and other fruits, oil yielding plants, gums, spices and aromatics, drugs, rubber, gutta-percha, dye stuffs, tanning stuffs, and barks (varieties of cork). The varieties of each species, the climate and soil suitable to them, their cultivation, uses, diseases, product, etc., are treated concisely without sacrifice of essentials. One hundred and three pages are given to rubber and gutta-percha. The three volumes form an authoritative and comprehensive work on this subject.

The Natural History of Coal. By E. A. Newell Arber. x and 163 pp., illustrations and index. Cambridge University Press, 1911. 1s. 6½ x 5.

This is one of the little "Cambridge Manuals of Science and Literature." The author attempts, with good success, to answer simply such questions as the origin of coal, how it was formed. He also discusses problems relating to the geology or the paleobotany of coal, some of which are not yet solved or at least not satisfactorily elucidated. The book ends with a good bibliography and an index.

ANTHROPOGEOGRAPHY

Influences of Geographic Environment, on the Basis of Ratzel's System of Anthro-po-geography. By Ellen Churchill Semple. xvi and 683 pp.; 21 maps. Henry Holt & Co., New York, 1911. \$4.

Ratzel carried the investigation of geographic influences upon man and history a long step forward and embodied much of the fruit of his research in a book; his *Anthropo-Geography*. Moreover, he inspired a pupil to take up the investigation and carry it forward. This was a greater service. That pupil was Miss Ellen C. Semple, an American. To produce a book like this requires a combination of four factors not often within the reach of one person,—deep interest in a great subject, ability to handle it, training, and leisure. Nor does this imply that Miss Semple's book is simply the product of leisure hours. On the contrary, it bears every evidence of having cost a prodigious amount of labor.

The seventeen chapters deal with: The Operation of Geographic Factors in History, Classes of Geographic Influences, Society and the State in Relation to the Land, Movements of Peoples, Geographic Location, Geographic Area, Geographic Boundaries, Coast Peoples, Oceans and Enclosed Seas, Man's Relation to Water, The Anthropogeography of Rivers, Continents and their Peninsulas, Island Peoples, Plains, Steppes and Deserts, Mountain Barriers and their Passes, Mountain Environment, The Influences of Climate upon Man.

Miss Semple, or anyone else, who attempts to estimate the actual weight of geographic influences in the history or development of a people, attempts the impossible. The influences which have directed the course of history are too complicated. The same influences are not equally effective in different periods of history. Whatever part geographic influences had in making Ancient Greece, it is evident that those influences are not effective now, or else they are offset by other and stronger influences which were not operative in ancient times. In her chapter on the Operation of Geographic Factors in History, the author clearly takes the ground that Geographic Influences themselves undergo a process of evolution and that a set of factors which brought about a certain result in an earlier stage of history, may not do it in a later stage.

Unquestionably Miss Semple has tried faithfully to be conservative and guarded in her statements. She believes enthusiastically in her thesis; and there are frequent statements in her book which, if taken literally, seem extravagant. For example, "It was the Danube that, in the fourth century, carried Arianism . . . to the barbarians of Southern Germany and made Unitarians of the Burgundians . . ." Of course, this is a figure of speech, not intended to be taken literally. The author herself says (page 11), "The study of physical environment as a factor in history was unfortunately brought into disrepute by extravagant and ill-founded generalization, before it became the object of investigation according to modern scientific methods." All in all, a careful and friendly reader can not escape the conviction that the author has aimed to be conservative. An unsympathetic reader may not grant that she has always been successful in that endeavor.

One thing that impresses the reader is the enormous breadth of reading, the endless verifying of references, the search and research, the sifting and resifting of material, involved in the preparation of the book. There are nearly 1,500 citations of authorities. The chapter on Island Peoples alone is followed by 223 references. The geographers of the English-speaking world will thank Miss Semple for a generation to come for her splendid work in preparing this bibliography.

There is method in every chapter of the book. The framework stands out clearly and is usually indicated by the marginal sub-heads. General principles are stated, usually as topic sentences of paragraphs, then follow illustrations. The treatment of "Man's Relation to the Water" will illustrate. After laying down the general thesis that man uses the waters of the earth as places for passing and repassing, not for his abiding, the author gives some twenty-five examples of peoples, chiefly among primitive races, who live or lived in pile dwellings, in boats, or who otherwise chose the water rather than the land for an abiding place. Then follow examples of the reclamation of land from the sea as in Holland, or from river floods, as in China; the practice of irrigation in many lands and its socializing and unifying effect upon communities; the effect of coast line and of fishing upon the maritime development of a

people. This formulation of principles—this terse statement in words of great truths which all of us have imperfectly thought out, this collecting of many illustrations—are the qualities in the book which give it substance.

The index is a model of completeness and will add vastly to the usefulness of the book for reference purposes. An idea of the completeness of the index may be gathered from the fact that there are over 100 page references to *Nomads*, twenty-five to *Fur Trade*, fifty to *England* and one hundred to *Boundaries*. There are forty-five double-column pages in the index.

If the reviewer were disposed to look for faults in the book they doubtless might be found. But the great service which Miss Semple has done for Geography, the years of work which the book has cost, the pardonable pride which we feel in knowing that an American Geographer did the work, all impel this reviewer, at least, to dwell upon the excellencies of the book rather than to seek minor points of weakness.

R. H. WHITBECK.

EDUCATIONAL

The Continents and Their People: North America: A Supplementary Geography by J. F. Chamberlain and A. H. Chamberlain. xi and 299 pp., maps, illustrations and index. The Macmillan Company, New York, 1911. 55 cts. $7\frac{1}{2} \times 5$.

Intended "to supplement and enrich the work offered by the text-books in geography." Although the authors in the preface say that "mere statement of fact is not geography" and believe that in their book "cause and consequence have been related" their product shows lack of grasp of the subject and ignorance of modern geographical methods, with the result that the very element of correlation which they claim for their book is excluded. Their indulgence in vague generalities also is unfortunate though typical of too many text-books in geography. The references to the Glacial Period and to various physiographic processes, even if conceded to be justifiable in a book intended for use in grammar schools, are purely casual and confuse rather than further the development of conceptions. The maps are of the usual uncritical type.

W. L. G. J.

Elements of Geology. By Eliot Blackwelder and Harlan H. Barrows. 475 pp., maps, illustrations and index. American Book Company, New York, 1911. \$1.40. $7\frac{1}{2} \times 5$.

The book makes a point of relegating volcanoes and earthquakes to the minor place where they belong, and of presenting its matter in a way to cultivate the reason. In good hands it will probably do so. The questions seem well planned for the purpose. Perhaps it is a little hard on other authors to ask them to admit that they have not had the same intention. Another feature is the introducing the historical part by an account of the chief animal and plant groups, which is a good thing.

Very noticeable in this part is the almost complete omission of cuts or descriptions of fossils. The material used is living, similar forms or restorations of the ancient ones. So far the pendulum has swung. Perhaps this is an over-emphasis, for the geologist is concerned with fossils not a little as mere fossils, marking strata, as they might do were they the mere sports of nature they were once believed to be. Without reference to the living forms that made them, they serve him to establish rock structures and displacements.

A geographer must be delighted with the simplicity of the scheme of North American topographic regions at p. 63. Most such classifications are far too complex. Equally will he welcome the maps of Tertiary mountain folds at p. 438 and Paleozoic ones at 372.

The respect shown the planetesimal theory is natural and acceptable, but when it is said of the nebular hypothesis that it is "improbable that the materials which became the planets could have separated from the equatorial portion of the nebula in the form of rings" the student will be justified in asking "Why not?". Of course he does not ask questions. He does not venture on excursions into reasoning. He sees his author is *against the hypothesis*, and follows the cue!

The summaries after igneous rocks and closing chapters V and VI are good. Similar ones would well close other chapters, too. Why not admit (p. 188 and 230) that streams and glaciers *deposit* as explicitly as it is stated that they wear down? In the Great Lake country, above all.

The changed groupings of Eras and Epochs may be necessary with growth, but for school texts it is unfortunate. Since the last text that has come to this reviewer's hand one geologic Era has disappeared—the Algonkian and eight new periods have arisen.

The text-book is a very good one. It lacks a geologic map, but for the rest is well illustrated with abundant good pictures and maps.

MARK JEFFERSON.

Commercial Geography. By Albert Perry Brigham. xv and 469 pp., 17 colored maps, 238 diagrams and illustrations, and index. Ginn & Company, Boston, 1911. \$1.30. 8 x 5½.

Those who are interested in either the study or teaching of geography will welcome this new text from the pen of Prof. Brigham. The author's reputation for scholarly work is sufficient guarantee that in this respect the book is all that could be expected or desired. The treatment of the subject is, however, noticeably different from that in most of the other commercial geographies which have recently appeared.

Part I, an "Introduction to Commercial Geography," covers ninety-two pages, and is devoted to the treatment of wheat, cotton, cattle, iron and coal, and a brief statement of the "Principles of Commercial Geography." The first five of these topics cover the vegetable, animal and mineral products of greatest importance to the American student for whose use the book was primarily prepared. They are so treated as to put him at once into possession of the most significant facts concerning their production, transportation and manufacture. The fact that the people of the United States are greatly interested in all five of these fields of industry makes it possible to base the discussion upon conditions as found in our own country and to draw the illustrations chiefly from United States sources. Foreign countries in which these industries are important are, however, by no means neglected. The chapter on "The Principles of Commercial Geography," although brief, is particularly well placed, as it makes use of the information already obtained concerning the nature and distribution of these important products. The growth of the exchange of products is pointed out, and the constant improvement of transportation and manufacture, as a result of improved standards of living, is noted. The aid and protection which a government seeks to give its people is also commented upon. On the whole

this part forms a most satisfactory introduction to a study of the subject in its details.

Part II is devoted to the "Commercial Geography of the United States." It occupies 186 pages of the text and discusses in order the Plant, Animal and Mineral Industries and the "Water Resources" of our country. This is followed by a consideration of the "Concentration of Industries" and the development of "Centres of General Industry" and the consequent necessity of "Transportation" and "Communication." It closes with a particularly well written and suggestive chapter on "Government and Commerce" and the "Foreign Commerce of the United States." Part II is especially rich in diagrams and illustrations, many of which are new and of great value.

Part III is on the "Commercial Geography of Other Countries." Here the author has avoided the statistical treatment which most books use at this point. Instead, the attention of the student is directed to those countries with which our own maintains close and important commercial relations. Canada is treated first for obvious reasons. This is followed by the "United Kingdom," "France and Belgium," and "The German Empire and the North Sea Countries." In each of these chapters the various topics have been kept in nice balance. The facts in the development of the leading industries have been given enough prominence, so that the student may understand, in part, what the new world owes to the old. The remainder of Europe is treated in two chapters and each of the other continents has a chapter. The book closes with a chapter on "The World's Commerce," which is in part a brief historical review of the development of trade, and in part a statement of the effects of commerce upon society and morals.

The book is beautifully printed and finely and judiciously illustrated.

C. T. MCFARLANE.

Highroads of Geography. The Royal School Series. Book I.—Sunshine and Shower. 128 pp. and ills. 10d.; Book II.—Scouting at Home. 170 pp. and ills. 1s. Thomas Nelson & Sons, London, 1911. 8½ x 6 each.

Simple readers in the elements of geography, designed for beginning pupils. The first book includes lessons in the form of a story framed about a garden in England, in which the water and air at work are studied, followed by descriptions of visits to the mountains and the seashore. The information imparted is given interestingly and clearly and is in general accurate, though an exception must be made to the statement that irregularities in the surface have been made like the wrinkles on a dried-up apple. The illustrations are largely in color and are reproductions of well known masterpieces.

The second book takes up the Boy Scout idea and follows the plan of training children to be scouts, by first presenting in a simple and effective way the meaning and use of maps. This is followed by a series of lessons on the weather, on the erosive processes and the rocks, with a brief treatment of certain industries. The volumes are on an original plan and are well done. They are good, supplementary reading for oral lessons, previous to any use of a text-book.

RICHARD ELWOOD DODGE.

GENERAL

Modern Geography. By Marion I. Newbigin, D.Sc., Editor of the *Scottish Geographical Magazine*. Home University Library of Modern Knowledge, No. 7. 256 pp., maps, diagrams and index. Henry Holt & Co., New York, 1911. 75 cts. 7 x 5.

This book cannot be recommended too strongly to the general reader who wishes to inform himself of the present status of modern geographical science. In nine chapters, to which is added a brief list of standard references, it covers the whole field of geography and points out very clearly what constitutes the distinctive geographic point of view and method. This is accomplished not by an abstract discussion of principles but by an extremely readable presentation of well-chosen examples.

An introductory chapter treats of the beginnings of modern geography, with which the names of Humboldt, Ritter and Darwin are so intimately associated. Two chapters are devoted to the larger features of the relief of the earth's surface and to a discussion of normal and of glacial erosion. The chapter on climate and weather demonstrates the general principles of climatology by means of a characterization of the Mediterranean type. Subsequent chapters on plant and animal geography bring out particularly well the broad aspects of these branches of our subject and afford a welcome relief from the product of writers whose conception of geography still seems to be limited to physiography. A chapter on cultivated plants and domesticated animals leads logically to the discussion of man. Chapter VIII on the races of Europe discusses their present distribution, their origin and the conditions of their environment which have made for differentiation. The final chapter on the distribution of minerals as a potent factor in the localization of industries and in the development of transportation affords an excellent example of the conciseness of statement and the breadth of view characteristic of the book throughout.

The publishers are to be congratulated upon the inception of the series of which this volume forms a part. To judge by the volumes so far published it bids fair to become in English a worthy equal to the well-known "Götschen Sammlung."

W. L. G. J.

Guide to Geographical Books and Appliances. The Second Edition of "Hints to Teachers and Students on the Choice of Geographical Books for Reference and Reading." By H. R. Mill, LL.D., D.Sc., Revised by A. J. Herbertson, J. F. Unstead and Nora E. Macmunn. viii and 207 pp., Published for the Geographical Association by George Philip & Son, Ltd., London, 1910. 5s. 8½ x 5½.

Dr. Mill presented all his rights in his well-known book "Hints to Teachers" to the Geographical Association (Great Britain) on condition that a new edition be produced. This condition has been fulfilled by the preparation and publication of the present work. The plan and most of the contents of the earlier work are reproduced, but the number of works recorded is much longer than in the original book. The object of the volume, as Dr. Mill said in the first edition, "is to place before teachers and students a selection of the best available books on geography as an educational subject, and on different parts of the world." This purpose is admirably carried out and extended in the new edition. While not wholly complete the list is a good teachers' and students' guide to most of

the best books on geography, for reading, study or reference, in English, German and French. There are, however, a number of inaccuracies which should be corrected in the next reprinting.

The Dangers of Municipal Trading. By Robert P. Porter. xiii and 320 pp and index. George Routledge & Sons, Ltd., London, 1907. 7½ x 5.

The book contains the substance of many lectures and addresses delivered by the author before various bodies in England. The facts he gives illustrate the dangers of state or municipal interference with industrial development and the unwisdom of usurpation by public authorities of functions which are better left to private companies and to individual enterprise. The larger part of his data was collected in Great Britain.

Die Indogermanen. (Wissenschaft und Bildung. Einzeldarstellungen aus allen Gebieten des Wissens. Herausgegeben von Privatdozent Dr. Paul Herre). Von Dr. phil. O. Schrader. 165 pp. and illustrations. Verlag von Quelle & Meyer, Leipzig, 1911. Mk. 1.25 7 x 5.

This highly valuable volume, interestingly dealt with throughout, is a revision to a type of twenty years ago. At that time English students lent their aid to a series of primers of science topics. The defect in the method was that the method of treatment was far too jejune for the needs of specialists trained in each particular subject, and equally far too rich for the use of beginners. The unfortunate result was that students of a not infrequent type studied the primer and not the science, thereby were they able to pass examinations with flying colors and qualify to their own complete satisfaction as leaders of thought without training in the capacity of thinking, with deplorable results which have not yet wholly worn off.

As a primer this small volume is free from the mechanical defect of the earlier type. Of necessity it has been subjected to great condensation, yet it is easy reading and wholly free from the catechetical manner. The moot points are very clearly stated with judicial balance in presentation. It may safely be put in the hands of junior students, always under the inspiration of competent teachers; to more advanced students it will fill an important position as a syllabus of the most recent opinions upon the Aryan family, its language, social complex, life and migration. For the general reader, of course interested in the backward view of his ancestry but scantily tolerant of the arduous detail of special investigation, this volume supplies an excellent conspectus of the most modern views. How fresh and modern it is may be seen from the brief but well-balanced bibliography or short index of collateral reading; with the exceptions of Schrader's *Handelsgeschichte* (1886) and Delbrück's *Verwandtschaftsnamen* (1889), not one of the authorities cited is more than fifteen years old.

WILLIAM CHURCHILL.

Eastern Asia. A History. By Ian C. Hannah, M.A. 327 pp., appendices and index. Frederick A. Stokes Company, New York, 1911. \$2.50. 9 x 5½.

This work is history only in the sense that the monkish chronicles of Europe are history. To compress into a score of chapters the events of three-quarters of that continent where history began and grew old before our race had emerged into the lowest and immemorial barbarism is impossible from the start. The result in this volume partakes rather of the nature of the "quiz" or ready com-

pend whereby matters are made easy for such as find their highest education in passing examinations. We may instance the great figure of Tamerlane, who receives four pages in this narrative. There are dates, some names of places, and that is the sum for one of the great names of history. Taking this work as a mere compend, its value would have been largely increased by footnotes or a bibliography whereby the student might be directed to sources from which he could derive more detailed information.

Our estimate of the purpose of this work as a feeder to examinations is confirmed by the author's preface, in which he sets forth that in the ten years which have elapsed since the first edition much lecturing on the subject for university extension has given him, he trusts, a better grip of the subject. Dealing with peripheral phenomena, for it is only on the edges of his eastern Asia that history has been preserved in dated records, he is forced to pursue several threads, each for a certain space and then to wait until the other threads are drawn out to equal length before he can resume each earlier thread. The result is the appearance of lack of continuity. Yet here, as wherever men live, history is continuous, it has continued here longer from the remote past than elsewhere on the world. A great change of direction marks the modern from the former epochs of Asian history. The newer impulse to the history of the great home continent is centripetal; Europe comes to Asia by water and from the shore seeks the inner empires. But the ancient impulse was centrifugal; from the inner deserts ever swarmed fresh hordes of brute barbarians seeking with destructive avidity to enjoy the delights of culture. When we write European history the beginning of the present is in a past ravaged by the Goth and the Varangian, and beginning with them we obtain a consistent picture. Whether compend or history, the story of eastern Asia, likewise, must be written from within outward if we are at all to have a connected narrative. This work will have its field of usefulness; from its index the inquirer will find it easy to discover such memorable facts concerning the larger figures of Asiatic life as will satisfy most inquiry.

WILLIAM CHURCHILL.

The Book of the English Oak. By Charles Hurst. 196 pp., map, 14 illustrations and index. Lynwood & Co., Ltd., London, 1911. 5d. $7\frac{1}{2} \times 5$.

The author has found much of interest to say about the English oak. It would scarcely be expected that a whole book could be filled with the oak tree; but the oak has many moods, conditions and aspects, and the author has found many sides of it to tell about. He treats its traditions, its place in poetry and shows how every Englishman may enrich his country by cultivating the oak and thus perpetuating one of the most characteristic features of the English landscape.

Coral and Atolls. Their History, Description, Theories of Their Origin both Before and Since that of Darwin, the Influence of Winds, Tides and Ocean Currents on Their Formation and Transformations, Their Present Conditions, Products, Fauna and Flora. By F. Wood-Jones, B.Sc. xxiii and 392 pp., map, illustrations, bibliography, appendices and index. Lovell, Reeve & Co., Ltd., London, 1910. 24s. $9 \times 6\frac{1}{2}$.

The title conceals the fact that this volume contains a most interesting account of the kings of Cocos-Keeling, a topic that cannot fail of attracting attention. The adventure side of geography has had its great share in the upbuild-

ing of the science. There has never been lack of brave men who have gone to the edge of things to carve out kingdoms for themselves. In these waters of the Indo-Pacific three come readily to mind: Greig of Fanning Island, Brooke of Sarawak, Clunies-Ross of Cocos. It is but among the yesterdays that Greig sold Fanning to a commercial company and relinquished a dream which, after all, is mediæval in its conception. Sarawak under the second of the Brookes has fallen into place as one of the sovereign lands of the earth. Yet older is the kingdom of Cocos-Keeling, for the third Ross now wields the kindly authority of his ancestors. It is a fine tale of brave deeds, a pity that there is no word to show that this is in the contents of the book.

Cocos possesses singular interest for every student of the contribution of the corals to land formation. It is the type specimen which underlies all of Darwin's theory of subsidence, the only atoll which he ever had the opportunity to examine. But Darwin knew Cocos for only ten days and sailed away; Dr. Wood-Jones spent fifteen months in the daily study of the growth of Cocos through the accretion and destruction of its corals.

He begins his series of valuable studies by an examination of the life history of the minute unit, the zoöid, which is the agent in this great structural geography. At the outset he renders a great service by his proof that the nomenclature of the corals is wholly misleading, because the systematic biologists have been misled by differences in the stony remains found in museum cabinets which are not characteristic of specific differences. He is very careful to point out that the zoöid is peculiarly susceptible to the external influences of its habitat, both in the individual coral colony and in the lagoon or outer reef conditions in which it must live. He avers, and it carries conviction, that the variety in the stony remnant of that which was once alive records conditions of environment, not such structural difference as may serve for the foundation of species. His observations tend to strengthen the genera under observation, to show how needlessly and how improperly the synonymy is overloaded with untenable species.

In his study of the individual zoöid he introduces that factor which he develops more and more into the explanation of reef formation, the effect of sedimentation. In the story of the zoöid he makes it clear that it is the heaping up of a few grains of sand upon the soft tissues which kills the animal. Passing to the next higher unit he carries along to each of the important genera of lagoon and reef corals the study of the effect of this depositing of foreign material. He has made such excellent use of the *Porites* that we may follow his discussion along toward the valuable conclusions at which he addresses it. The colony of *Porites* tends to form a spherical mass not at first attached to the base upon which it grows or by no more than a pedicel. As the colony increases by growth the lower zoöids have to bear the weight of the superincumbent mass and are at the same time suffocated by being forced down upon the sand or rock on which they rest. The death of these individuals tends toward the deformation of the colony toward the dome, or half-sphere, shape. The summit zoöids are equally imperilled by the conditions of their life, the silt carried by the water is deposited on the colony, on the sloping edges it is cleared by the activity of the zoöid, falls by gravity or is scoured by the water movement. But on the summit of the dome the sediment remains, the zoöids die and deformation follows. In the end the classic type of the *Porites* colony reproduces the type of the atollon, as that is a miniature of the completed atoll.

The theory is most ingeniously elaborated. The author discusses the warring theories as point by point they arise for consideration; but it is rather discussion *ex laguna* than discussion *ex cathedra*. Does a point need attention, he takes us at once to the waters and shows us just what processes of nature are now operative. It is a most attractive method and should lead to a better comprehension of this great factor in land formation. WILLIAM CHURCHILL.

Im Ballon über die Jungfrau nach Italien. Naturaufnahmen aus dem Freiballon. Von Gebhard A. Guyer. Mit einem Anhang, Himmelfahrt traversierung der Alpen im Ballon "Cognac" von Konrad Falke. 45 pp., map and illustrations. Gustav Braunbeck & Gutenberg—Druckerei Aktiengesellschaft, Berlin, 1910. 10 x 7.

A series of forty-eight engravings of photographs taken in the upper air from a balloon above the Alps. Most of them are fine specimens of photography, with wonderful cloud effects, showing the aspects of the upper parts of the mountains with *névé* fields above which the peaks arise. A brief description of each view is given. The book concludes with the story of Mr. Falke's air journey across the Alps.

Le Grandi Comunicazioni, di Terra e di Mare. By Capt. Luigi Giannitràpani. vi and 214 pp., maps, appendices and index. Nicola Zanichelli, Bologna, 1911. 6½ x 4½.

An excellent study of modern means of communication by land and sea in all parts of the world. The treatment in so small a volume is necessarily condensed, but the essentials are given. The work is illustrated by three maps well produced by the Istituto Geografico de Agostini-Novara.

How to Use Contour Handmaps for Class Teaching. Suggestions for Practical Exercises with Coloured Facsimile. By J. A. White. 8 pp. and maps. George Philip & Son, Ltd., London, 1911. 6d. 8½ x 5½.

The purpose is to show how contoured hand maps may be used to acquire a sound knowledge of the geography of a region in a series of class-room exercises. A contour map of Scotland is employed to illustrate some phases of the method advocated.

Historia de las Guerras Civiles del Perú (1544-1548), y de Otros Sucesos de las Indias. Por Pedro Gutiérrez de Santa Clara. Tomo Cuarto. 571 pp. and index. Librería General de Victoriano Suárez, Madrid, 1910. 10s. 6d. 8 x 5.

This fourth volume of the historical chronicle, the first three volumes of which have already been reviewed in the *Bulletin*, does not call for any extended mention. It is a pure chronicle of events, highly important for an intimate knowledge of the troubled time immediately preceding the complete restoration of royal authority in Perú by Pedro de la Gasca. For so-called political geography it affords interest through the mention of places, water-courses and the like, as any other chronicle would, but there is less descriptive geography in it than in the preceding volumes. There is much analogy with the third part of Cieza de Leon, as far as the latter is known.

AD. F. BANDELIER.

The Inquisition in the Spanish Dependencies. Sicily-Naples-Sardinia-Milan-The Canaries-Mexico-Peru-New Granada. By Henry Charles Lea, LL.D., S.T.D. xvi and 564 pp. and index. The Macmillan Co., New York, 1908. \$2.25. 9 x 6½.

A comparatively brief sketch of a lengthy and complicated question, based largely upon the material furnished by José Toribio Medina, a highly respectable fountain of knowledge. A critical review of the book lies entirely outside the scope of this *Bulletin*. The work has attracted deserved attention and has, therefore, been abundantly reviewed.

AD. F. BANDELIER.

Imperial Telegraphic Communication. By Charles Bright, F.R.S.E. xxiv and 212 pp., map and index. P. S. King & Son, London, 1911. 7½ x 5.

Treats of the development of the telegraph and cable service in the British Empire and is in some sort a history of the movement for extended and cheaper telegraphy. The appendix gives a table of charges for foreign and colonial telegrams from any part of the United Kingdom.

Plant-Animals. Study in Symbiosis. By Frederick Keeble, Sc.D. viii and 163 pp., illustrations, bibliography and Index. University Press, Cambridge, 1910. 40 cents. 6½ x 5.

This is one of the "Cambridge Manuals of Science and Literature." While Dr. Keeble was working in a small marine laboratory in Brittany, visitors often asked him to explain his purposes in going to and fro along the shore, wading among the sea weeds "and bringing into the laboratory minute, worm-like, animals which represented often my sole catch." Many of the visitors became interested in the work and the numerous questions they asked suggested this little volume. He has written it *con amore*, tells of many striking phenomena and few readers can fail to be interested in these pages.

La Haute-Loire et le Haut-Vivaraïs. Guide du Touriste, du Naturaliste et de l'Archéologue. Par Marcellin Boule. viii and 366 pp., map, illustrations and index. Masson et Cie, Paris, 1911. Fr. 4 50. 7 x 4½.

This volume completes the small series by Mr. Boule on the central volcanic massif of France. All intelligent persons visiting the regions described will find that the large variety of information presented will add much to the pleasure and the profit of their journey.

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NEW MAPS

EDITED BY THE ASSISTANT EDITOR

System Followed in Listing Maps.

Title. As on original, if possible. If lacking or incomplete, necessary matter enclosed in brackets.

Scale. Natural (unless otherwise on original), followed by equivalent in miles to one inch. If no scale on original, approximate scale enclosed in brackets.

Coordinates. Approximate limiting coordinates of map given. Where map-net lacking, coordinates, if possible of determination, given in brackets. All meridians referred to Greenwich. If map not oriented N., orientation given.

Colors. Number of tints of separate symbols, not number of color printings given. Black or basal color not considered a color.

Source. If map separately published, name of institution issuing it, place and date given. If a supplement, title of paper or book, author, periodical, volume, pages and year given.

Comment. Descriptive and critical. In brackets.

Regional Classification. Major political divisions the unit, as a rule, except for United States and Canada. Boundaries of continents according to Siever's *Länderkunde*, Kleine Ausgabe.

MAPS ISSUED BY UNITED STATES GEOLOGICAL BUREAUS

U. S. GEOLOGICAL SURVEY

Maps Accompanying Publications

ALASKA. Map Showing Relation of Alaska Coal Fields to Transportation Routes. [1:111,200,000 approx. (1 in.=176.8 miles approx.). 72° - 52° N.; 178° - 126° W. Accompanies, as Pl. I, facing p. 52, "Alaska Coal and its Utilization" by A. H. Brooks, *Bull.* 442-J (extract from *Bull.* 442), 1911.

[Valuable map showing areas known to contain workable coals and coal-bearing rocks; location of mountain axes, rivers navigable in summer and limits of sea ice in winter. For similar delineation of mountain axes see map facing p. 178, *Bull. Amer. Geogr. Soc.*, Vol. 42, 1910.]

COLORADO. (a) Map showing approximate distribution of the principal silver, lead and gold regions in Colorado. After Spurr. [1:3,350,000 approx. (1 in.=52.9 miles approx.).] 41° - 37° N.; 109½° - 101½° W.

- (b) Outline Map of the Region Adjacent to Breckenridge, Colo. 1:250,000 (1 in.=3.95 miles). [39°43' - 39°15' N.; 106°32' - 105°44' W.].
- (c) Geologic Map of the Breckenridge District, Colorado. Geology by F. L. Ransome and E. S. Bastin. Surveyed in 1909-11. 1:24,000 (1 in.=0.38 mile). 39°33' - 39°27' N.; 106°4' - 105°56.8' W. 15 colors.
- (d) Map Showing Topography and Mining Claims in the Breckenridge District, Colorado. Surveyed in 1908. Contour interval 50 ft. Same scale and coordinates as map (c). 3 colors.
- Accompany, as Fig. 1 on p. 14, Pl. III facing p. 16 and Pls. I and II in pocket, "Geology and Ore Deposits of the Breckenridge District, Colorado" by F. L. Ransome, *Prof. Paper* 75, 1911.
- NEW MEXICO. (a) Map showing location of Estancia, Encino and Pinos Wells basins. [1:4,000,000 approx. (1 in.=63.1 miles approx.)]. 35½° - 33½° N.; 107° - 102½° W.
- (b) Map of Estancia Valley, New Mexico, Showing Physiography and Pleistocene and Recent Geology. 1:375,000 (1 in.=59.18 miles). [35°25' - 34°20' N.; 106°30' - 105°40' W.]. 5 colors.
- (c) Map of Estancia Valley, New Mexico, Showing Depth to and Quality of the Ground Waters. Same scale and coordinates as map (b). 6 colors.
- (d) Reconnaissance Geologic Map of the Ancient Lake Bed in the Encino Basin, New Mexico. 1 in.=1½ miles (1:195,040). [34°40' N. and 105°25' W.]. With geologic section. 6 colors.
- Accompany, as Fig. 1 on p. 7, Pl. XI facing p. 38 and Pl. XII facing p. 76, "Geology and Water Resources of Estancia Valley, New Mexico, etc." by O. E. Meinzer, *Water-Supply Paper* 275, 1911.
- VIRGINIA. Map Showing Economic Geology of Richmond, Va., and Vicinity. By N. H. Darton. 1:62,500 (1 in.=0.99 mile). 37°37' - 37°28.6' N.; 77°32' - 77°21' W. 8 colors. With geological section.
- Accompanies, as Pl. I facing p. 6, "Economic Geology of Richmond, Virginia, and Vicinity" by N. H. Darton, *Bull.* 483, 1911.

NORTH AMERICA

- ALASKA. Physical Map of Alaska. [1:12,200,000 approx. (1 in.=192.6 miles approx.)]. No map-net. 12 colors. Accompanies, as separate plate facing p. 36, "The Ice Age in North America" (5th edition) by G. F. Wright, Oberlin, O., 1911.
- [Land relief expressed in five tints and mountain hachuring, the latter primitive. Orthography of names obsolete.]
- CANADA AND UNITED STATES. Map Showing, in Dotted Lines, the Preglacial Drainage in the Basin of the Lower Great Lakes. Corrected, according to the latest information, by Professor J. W. Spencer. [1:4,000,000 approx. (1 in.=63.1 miles approx.)]. [46° - 41° N.; 85½° - 76° W.]. Accompanies, as separate plate facing p. 312, "The Ice Age in North America" (5th edition) by G. F. Wright, Oberlin, O., 1911.
- CANADA AND UNITED STATES. Map of the Glacial Lake Agassiz showing its relation to Hudson Bay and the Great Lakes. By Warren Upham, D. Sc. [1:14,200,000 approx. (1 in.=224.2 miles approx.)]. 58° - 44° N.; 114° - 76° W. Accompanies, as separate plate facing p. 401, "The Ice Age in North America" (5th edition) by G. F. Wright, Oberlin, O., 1911.
- NORTH AMERICA. Map of North America showing interlapping late Black River and early Trenton invasions from the Arctic, Atlantic, Gulf of Mexico and Pacific Sides. [1:70,000,000 approx. (1 in.=1105 miles approx.)]. No map-net. Accompanies, as Fig. 7 on p. 368, "Revision of the Paleozoic Systems" by E. G. Ulrich, *Bull. Geol. Soc. Amer.*, Vol. 22, pp. 281-680, 1911.
- UNITED STATES AND CANADA. Map Showing the Glacial Geology of the United States and Canada. [1:22,000,000 approx. (1 in.=347.3 miles approx.)]. 54° - 25° N.; 130° - 65° W. Accompanies, as separate plate facing p. 202, "The Ice Age in North America" (5th edition) by G. F. Wright, Oberlin, O., 1911.
- [Shows southern limit of ice-sheet and drift, terminal moraines, courses of glacial striae, mountain areas of local glaciation, Driftless Area of Wisconsin, modified drift in valleys of southward drainage from the ice-sheet, boundaries of glacial lakes.]

UNITED STATES

- CONNECTICUT. Preliminary Geological Map of Connecticut by H. E. Gregory and H. H. Robinson. 1906. 1:250,000 (1 in.=39.45 miles). 41 colors. Accompanies pamphlet with same title by same authors, *Bull.* No. 7, Connecticut Geological and Natural History Survey, 1907.
- [The standard general geological map of the state.]
- EASTERN UNITED STATES. (a) Map of the Southern Appalachian Valley Showing Outcrops of Ordovician Rocks. [1:12,000,000 (1 in.=31.6 miles approx.)]. Oriented N. 36° E. 38° - 34° N.; 85°30' - 80°15' W.
- (b) Sketch Map of southeastern North America Showing Appalachian troughs and principal lines along which stratigraphic overlaps are common. [1:28,500,000 approx. (1 in.=450.6 miles approx.)]. 53° - 28° N.; 102° - 55° W.
- Accompany, as Pl. 25 (frontisp.) and as Fig. 1 on p. 203, "Revision of the Paleozoic Systems" by E. O. Ulrich, *Bull. Geol. Soc. Amer.*, Vol. 22, pp. 281-680, 1911.
- FLORIDA. Geologic Map of North-Central Part of Florida Suggesting oscillation of the Ocala dome. From map published by Florida State Geological Survey, 1909. [1:2,200,000 (1 in.=34.7 miles approx.)]. Scale incorrectly given as 1:1,000,000. 30°35' - 27°25' N.; 83°25' - 81°0' W. Accompanies, as Fig. 13, on p. 431, "Revision of the Paleozoic Systems" by E. O. Ulrich, *Bull. Geol. Soc. Amer.*, Vol. 22, pp. 281-680, 1911.
- MAINE. The Kames of Maine and southeastern New Hampshire. [1:4,200,000 approx. (1 in.=66.3 miles approx.)]. [42° - 42½° N.; 71½° - 67° W.]. Accompanies, as Fig. 104 on p. 344, "The Ice Age in North America" (5th edition) by G. F. Wright, Oberlin, O., 1911.
- MINNESOTA. Map showing the stages of recession of the ice in Minnesota. (Upham). [1:6,200,000 approx. (1 in.=99.9 miles approx.)]. 49° - 43½° N.; 97° - 90° W. Accompanies, as Fig. 181 on p. 662, "The Ice Age in North America" (5th edition) by G. F. Wright, Oberlin, O., 1911.
- NEW YORK. Map of western New York, showing distribution of morainal deposits. (From U. S. Geological Survey). [1:13,600,000 approx. (1 in.=56.8 miles approx.)]. [43°30' - 41°20' N.; 80° - 75° W.]. Accompanies, as Fig. 65 on p. 206, "The Ice Age in North America" (5th edition) by G. F. Wright, Oberlin, O., 1911.

NEW YORK. Free Public Educational Institutions of the City of New York in the Year 1911. Prepared by the Department of Public Education of the American Museum of Natural History. [1:54,000 approx. (1 in.=0.85 miles approx.).] Oriented N. 30° W. [40°55' - 40°33' N.; 74°12' - 72°45' W.]. 5 colors.

[Shows location of museums, public schools, high schools, corporate schools, public libraries and lines of transportation].

NORTH AND SOUTH DAKOTA. Sketch Map of the Missouri Coteau and its Moraines. By J. E. Todd, Asst. Geologist, U. S. G. S. [1:4,000,000 approx. (1 in.=63.1 miles approx.).] 48½° - 42½° N.; 101½° - 97° W. Accompanies, as Fig. 67 on p. 216, "The Ice Age in North America" (5th edition) by G. F. Wright, Oberlin, O., 1911.

UNITED STATES. [Two maps:] U. S. A. Census of 1900. (a) Map showing the increase per cent. of the population of each State between 1890 and 1900. (b) Map showing the increase per cent. of the population of each State between 1900 and 1910. 1:50,000,000, or 1 in.=789.13 miles. Accompany, on p. 403, "Some Recent Census Returns" (first part) by O. J. R. Howarth, *Geogr. Journ.*, Vol. 38, pp. 396-404, 1911.

CANADA

BRITISH COLUMBIA. [Map of Vancouver Island]. [1:2,000,000 approx. (1 in.=34.7 miles approx.).] On back cover of "Vancouver Island . . . : A History of its Resources by Districts" compiled by The Vancouver Island Development League, Victoria, B. C.

[Shows railroads and ferries in existence, those authorized or under construction and those contemplated. Gives ocean distances from Victoria to principal ports of the world.]

CANADA. Resource Map of the Dominion of Canada. 1911. 1:12,500,000, or 197.3 miles to 1 inch. 73° - 40° N.; 150° - 35° W. 5 colors. Accompanies "Statistics of the Dominion of Canada," Dept. of the Interior, Ottawa, 1911.

[Indicates location of principal raw products by their names printed in red. Coal fields and collieries shown.]

CANADA. Index map to Sheets of 1 Inch to 1 Mile & ½ Inch to 1 Mile Maps of Canada Published by Department of Militia and Defence. Geographical Section, General Staff, No. 2278. Index Map No. 12. Revised to Jan'y, 1911. [1 inch=40 miles (1:2,534,400)]. 47½° - 41½° N.; 85° - 70° W. 6 colors.

[Shows areas surveyed and sheets published. The regions so far covered by this survey are the southern half of the Interlake Peninsula of Ontario and the St. Lawrence Lowland from Ottawa and Kingston to below Montreal. These maps are very similar in quality to the topographic sheets of the U. S. G. S. and superior to them in that woods are represented on all sheets. The price of the sheets 1:63,360 is 50 cts., that of the sheets 1:126,720, 60 cts. apiece.]

SOUTH AMERICA

ARGENTINA-CHILE. Demarcación de Límites con Chile. 6a Sub-Comisión. Region de la Puna. Mapa Preliminar. Z. Sánchez. T. Loos. Julio de 1898. 1:200,000 (1 in.=3.16 miles). 24°40' - 27°27' S.; 66°20' - 67°10' W. Accompanies, facing p. 102, "Frontera Argentino Chileno. Informe del Jefe de la 6a Sub-Comisión de Límites con Chile. 1898. Informe No. 15. (Conclusión)," *Bol. Inst. Geogr. Argentina*, Vol. 25, pp. 82-103, 1911.

[Valuable large-scale map embracing the intermont plateau of the Puna de Atacama. Sketch contours.]

BRAZIL. (a) A Portion of Brazil showing relative position of Diamond fields. Reproduced from "Journal of the Royal Society of Arts," with additions by David Draper. [1:11,000,000 approx. (1 in.=173.6 miles approx.).] 11° - 24° S.; 58° - 38° W.

(b) [Geomorphologic] Map of Bagagem Valley. No scale. [19° S. and 48° W.]. Accompany, as Pls. III and IV, "The Diamond-Bearing Deposits of Bagagem and Agua Suja in the State of Minas Geraes, Brazil" by D. Draper, *Trans. Geol. Soc. South Africa*, Vol. 14, pp. 8-19, 1911.

BRAZIL. Planta do Littoral de S. Sebastião e do Rio Juquiriquerê. 1:50,000 (1 in.=0.79 mile). 23°37' - 23°48' S.; 45°40' - 45°19' W. 2 colors. Accompanies "Exploração do Rio Juquyerquerê [sic]," *Comm. Geogr. e Geol. do Estado de S. Paulo*, 1911.

[One of the excellent exploratory surveys along river courses which is covering the state of São Paulo with a net-work of surveyed lines.]

COLOMBIA. Península de la Guagira [Guajira] por F. A. A. Simons. [1 in.=15 miles (1:950,400)]. 12°30' - 10°40' N.; 73° - 71° W. 1 color. Accompanies, facing p. 404, "Los Indios Guagiros" (first part), translated from the English of F. A. A. Simons by A. Ernst, *Rev. Tecn. Minist. Obr. Publ.* (Caracas, Venezuela), Vol. 1, pp. 403-408, 1911.

[Taken from a report on an exploration made for the Colombian Government in 1883-84, published in the *Anales de la Instrucción Pública de Colombia*.]

VENEZUELA. Croquis de los caminos de recuas entre Santa Lúcia, Caucagua y Guatire. 1:150,000 (1 in.=2.37 miles). [10°30' - 10°10' N.; 66°50' - 66°25' W.]. Accompanies, facing p. 392, report on "Camino entre Boca de Siquire, Caucagua y Guatire" by M. L. Quintero, *Rev. Tecn. Minist. Obr. Publ.* (Caracas), Vol. 1, pp. 390-393, 1911.

AFRICA

CENTRAL AFRICA. Route of the Expedition [of the Duke of Mecklenburg, 1907-08]. 1:7,500,000 (1 in.=118.37 miles). 6° N. - 6° S.; 12° - 42° E. 2 colors. Accompanies "In the Heart of Africa" by Duke Adolphus Frederick of Mecklenburg, London, New York, etc., 1910.

EASTERN SAHARA. Sahara Orientale. [1:24,400,000 approx. (1 in.=385.1 miles approx.).] [38° - 7° N.; 6° - 36° E.]. Accompanies, on p. 323, "Les Turcs en Afrique Centrale: La Frontière Franco-Tripolitaine" by M. Cortier, *L'Afrique Franç.*, Vol. 21, pp. 320-328, 1911.

[Shows Franco-Tripolitan boundary, caravan routes and uninhabitable deserts.]

FRENCH GUINEA. (a) Schéma des Sources du Niger et du pays Toma. [1:9,900,000 approx. (1 in.=142.0 miles approx.).] [13 2/5° - 7° N.; 12° - 5½° W.].

(b) Projet de délimitation en 1906 [between French Guinea and Liberia]. [1:7,100,000 approx. (1 in.=112.1 miles approx.).] [9° - 7° N.; 11° - 8½° W.].

(c) Carte du Pays Toma. Dressée d'après les travaux de M. le Lieut. Bouet, des Officiers du Secteur Militaire et de la Mission de Délimitation. [1:950,000 approx. (1 in.=15.0 miles approx.)]. $9^{\circ}8' - 7^{\circ}36' N.$; $9^{\circ}55' - 8^{\circ}40' W.$

(d) Frontière Franco-Libérienne. [1:6,800,000 approx. (1 in.=107.3 miles approx.)]. $9^{\circ}55' - 4^{\circ} N.$; $11^{\circ}35' - 6^{\circ}55' W.$

Accompany, on pp. 187, 188, 189 and 191, "Les Tomas" (first part) by F. Bouet, *Reus. Colon.*, No. 8, pp. 185-200, 1911.

[Map (c) a valuable map on a relatively large scale embodying original material.]

GERMAN AND BRITISH EAST AFRICA. Allgemeine Übersichtsskizze der Wohngebiete des Masai-volkes. 1:3,000,000 (1 in.=47.34 miles). $2^{\circ} N.$ - $6^{\circ}45' S.$; $33^{\circ}45' - 40^{\circ} E.$ 3 colors. Accompanies "Die Masai" by M. Merker, Berlin, 1910.

[Shows extent of steppe lands and approximate boundaries of Masai provinces.]

GERMAN AND BRITISH EAST AFRICA-BELGIAN CONGO. The [Duke of Mecklenburg's] Expedition's field of work. Prepared by Lieut. M. Weiss. 1:2,000,000 (1 in.=31.56 miles). $2^{\circ} N.$ - $6^{\circ} S.$; $24^{\circ} - 32^{\circ} E.$ With inset: The Volcanic district. 1:600,000 (1 in.=9.46 miles). [$1^{\circ}10' - 1^{\circ}50' S.$; $29^{\circ}0' - 29^{\circ}50' E.$]. 3 colors. Accompanies "In the Heart of Africa" by Duke Adolphus Frederick of Mecklenburg, London, New York, etc., 1910.

[Valuable original material on the region drained by the Kagera source of the Nile and the volcanic region N.E. of Lake Kivu.]

GERMAN EAST AFRICA. (a) Skizze von Daressalam mit den in den Jahren 1901-05 von Brandes, Koert, und Tornau ausgeführten Bohrungen. 1:20,000 (1 in.=0.32 mile). [$6^{\circ}50' S.$ and $39^{\circ}15' E.$]. (b) Skizze von Tanga mit den von Koert 1902-03 ausgeführten Wasserbohrungen. 1:15,000 (1 in.=0.24 mile). [$5^{\circ}5' S.$ and $39^{\circ}10' E.$].

Accompany, as Taf. 1 and Taf. 3, "Zur Geologie und Hydrologie von Daressalam und Tanga (Deutsch-Ostafrika)" by W. Koert and F. Tornau, *Abhandl. königl. Preussischen Geol. Landesanstalt*, Neue Folge, Heft 63, Berlin, 1910.

GERMAN SOUTH-WEST AFRICA. Farm-Übersichtskarte von dem Bezirk Gibeon und dem Distrikt Maltahöhe. Bearbeitet und gezeichnet im Bureau der kaiserlichen Landesvermessung in Windhuk durch den Topograph Karsunke. Nov. 1910. In 2 sheets. 1:200,000 (1 in.=3.16 miles). $23^{\circ}57' - 25^{\circ}50' S.$; $15^{\circ}53' - 18^{\circ}20' E.$ 3 colors. Accompanies, as Taf. 6, *Mitt. aus den Deutschen Schutzgeb.*, Vol. 24, No. 4, 1911.

[Excellent large-scale map showing generalized contours in brown, drainage in blue, farm boundaries in green.]

KAMERUN. Karte zu: Mann, Stand der geologischen Erforschung des Schutzgebietes Kamerun. 1:5,000,000 (1 in.=78.91 miles). $13^{\circ} - 15^{\circ} N.$; $6^{\circ}34' - 17^{\circ}45' E.$ 1 color. With two insets: (1) Buca und Umgegend. 1:2,500,000 (1 in.=39.45 miles). [$4^{\circ}20' - 5^{\circ}4' N.$; $8^{\circ}27' - 10^{\circ}20' E.$]. (2) [Map of Baden on same scale as main map for comparison]. Accompanies "Bericht über den Stand der geologischen Erforschung von Kamerun im Mai 1910" by O. Mann, *Mitt. aus den Deutschen Schutzgeb.*, Vol. 24, pp. 203-218, 1911.

[Shows, in red, Dr. Mann's route and the location of mineral deposits.]

RHODESIA. Sketch Map of the South-East corner of the Bangweulu Swamps inhabited by the Wa-Unga showing the channels connecting the Chambeshi and Luapula Rivers as traced during twelve journeys by boat and canoe, 1902-1910, by Frank H. Melland. 1:500,000, or 1 in.=7.89 miles. $11^{\circ}0' - 12^{\circ}2' S.$; $29^{\circ}15' - 31^{\circ}15' E.$ 1 color. With inset, 1:25,000,000, showing general location of main map. Accompanies "Bangweulu Swamps and the Wa-Unga" by F. H. Melland, *Geogr. Journ.*, Vol. 38, pp. 381-395, 1911.

[Valuable original map.]

SUDAN. Schéma du Massalit et itinéraires de la Compagnie Arnaud d'après les levés des lieutenants Delacommune, Théral, Jourdy, Béraud, etc. [1:930,000 approx. (1 in.=14.7 miles approx.)]. [$14^{\circ}5' - 13^{\circ} N.$; $21^{\circ} - 23^{\circ} E.$]. With inset map showing general location. Accompanies, on p. 281, "Données Géologiques sur le Ouadai et les Pays Limitrophes" by P. Lemoine, *L'Afrique Franç.*, Vol. 21, pp. 280-283, 1911.

TRANSVAAL. Sketch Map showing the approximate positions of the Kimberlite occurrences in the Pretoria District. [1 in.=4 miles (1:253,440). Scale incorrectly given.]. [$24^{\circ}37' - 24^{\circ}55' S.$; $28^{\circ}15' - 28^{\circ}43' E.$]. Accompanies, as Fig. 1 on p. 44, "Petrographical Notes on the Kimberlite Occurrences in the Pretoria District" by P. A. Wagner, *Trans. Geol. Soc. South Africa*, Vol. 14, pp. 43-63, 1911.

TRANSVAAL. [Geological Map of a portion of the Lower Witwatersrand System on the Central Rand.]. 1:160,000 approx. (1 in.=0.95 mile approx.). [$26^{\circ}15' S.$ and $58^{\circ} E.$]. Accompanies, as Pl. X, "Some Structural Features of the Witwatersrand System on the Central Rand, with a Note on the Rietfontein Series" by E. T. Mellor, *Trans. Geol. Soc. South Africa*, Vol. 14, pp. 24-42, 1911.

WESTERN AFRICA. Le Chemin de Fer de Guinée et ses Rapports Économiques avec le Cours du Niger. [1:21,300,000 approx. (1 in.=336.3 miles approx.)]. $21^{\circ} - 5^{\circ} N.$; $18^{\circ} W.$ - $13^{\circ} E.$ Accompanies note with similar title, *Tour du Monde*, Vol. 17, pp. 253-254, 1911.

ASIA

CEYLON. [Map of] Ceylon. [1:1,000,000 approx. (1 in.=15.8 miles approx.)]. $10^{\circ} - 5^{\circ} S.$; $79^{\circ}45' - 82^{\circ} E.$ Accompanies, in pocket, "The Veddas" by C. G. and B. Z. Seligman, Cambridge (England), 1911.

[Nomenclature especially full in Vedda country of east-central Ceylon.]

FRENCH INDO-CHINA. (a) Indochine Française. Carte Physique. 1:6,000,000 (1 in.=94.69 miles). $23^{\circ}5' - 8^{\circ} N.$; $100^{\circ} - 110^{\circ} E.$ 5 colors.

(b) Indochine Française. Carte Économique et Administrative. Same scale and coordinates as map (a). 2 colors.

(c) Cochinchine [Carte Physique]. 1:2,500,000 (1 in.=39.45 miles). $12^{\circ}10' - 8^{\circ}20' N.$; $103^{\circ}10' - 107^{\circ}55' E.$ 5 colors.

(d) Tonkin [Carte Physique]. 1:2,500,000. [$23^{\circ}35' - 19^{\circ}40' N.$; $101^{\circ}55' - 108^{\circ}20' E.$]. 6 colors.

Accompany, as Planches I-IV, "L'Indo-Chine française" by H. Russier and H. Brenier, Paris, 1911.

[Maps (a), (c) and (d) are good general physical maps showing relief in four or five tints, ranging from green through yellow to brown. Map (b) shows distribution of products, railroads and navigable rivers.]

INDIA. Kashmir. Sketch Maps to illustrate the explorations of Dr. A. Neve in the Himalayas, 1896-1920. 1:250,000, or 1 in.=3.94 miles. 3 colors. No. I. $34^{\circ}8' - 33^{\circ}50' N.$; $75^{\circ}42' - 76^{\circ}13' E.$ No. II. $35^{\circ}9' - 34^{\circ}46' N.$; $77^{\circ}27' - 77^{\circ}49' E.$

With two insets: (1) [Map of Kashmir showing Dr. A. Neve's route and location of maps Nos. I and II]. 1:120,000, or 1 in.=31.56 miles. $36^{\circ}35' - 33^{\circ}25' N.$; $75^{\circ}45' - 78^{\circ}23' E.$ 2 colors. (2) [Map of northern India showing general location of maps I and II]. 1:300,000,000 (1 in.=473.48 miles), 2 colors.

Accompany "Journeys in the Himalayas and Some Factors of Himalayan Erosion" by A. Neve, *Geogr. Journ.*, Vol. 38, pp. 345-362, 1911.

[Valuable original material on the Karakoram and the Himalayas on both sides of the upper Indus.]

PHILIPPINE ISLANDS. Sketch Map of the Taal Volcano Region. [1:103,000 approx. (1 in.=3.1 miles approx.)]. $14^{\circ} N.$ and $121^{\circ} E.$. Accompanies, as Pl. I facing p. 6, "The Eruption of Taal Volcano, January 30, 1911" (in English and Spanish) by M. S. Maso, Weather Bureau, Manila, 1911.

TURKEY IN ASIA. Map Showing Miss Gertrude Bell's Route from Aleppo to Konia. [1 in.=34 miles (1:12,154,240)]. $39^{\circ} - 32^{\circ}45' N.$; $32^{\circ} - 45^{\circ} E.$ 2 colors. Accompanies "Amurath to Amurath" by Gertrude L. Bell, New York, 1911.

AUSTRALIA AND OCEANIA

DUTCH NEW GUINEA. Schetskaart van het Sentani-Meer, Noord Nieuw-Guinea, door Kapn. F. J. P. Sachse, Febr. 1911. Aangevuld met de opnemings van de Koimé-rivier door luit. der inf. J. E. Scheffer. 1:100,000 (1 in.=1.58 miles). With inset map of Koimé River, 1:100,000, forming S. E. continuation of main map. Coordinates including both maps: $2^{\circ}32' - 2^{\circ}56' S.$; $140^{\circ}23' - 140^{\circ}45' E.$. Accompanies, as Kaart XII, notes on "De Exploratie van Ned. Nieuw-Guinea," *Tijds. kon. Ned. Aardr. Genoot.*, Vol. 38, pp. 823-833, 1911.

[Detailed survey of a lake near the coast of Dutch New Guinea at Humboldt Bay and of a tributary river course for 35 miles upstream, opening up hitherto unexplored territory.]

NEW SOUTH WALES. Geological Map of the Forbes-Parkes Gold Field. Geologically Surveyed by E. C. Andrews, assisted by C. E. Murtion. [1 in.=80 chains (1:63,360)]. $33^{\circ}9' - 33^{\circ}30' S.$; $147^{\circ}40' - 148^{\circ}15' E.$ 12 colors. With two geological sections. Accompanies "The Forbes-Parkes Gold Field" by E. C. Andrews. *Mineral Resources* No. 13, Geol. Surv. N.S.W., 1910.

NEW SOUTH WALES. Plan Showing Allan Cunningham's Route and Site of First Recorded Discovery of Gold in Australia. [1:400,000 (1 in.=6.3 miles approx.)]. $34^{\circ}40' - 34^{\circ}20' S.$; $149^{\circ}30' - 150^{\circ}20' E.$. Accompanies, on p. 125, "Botanical, Topographical and Geological Notes on Some Routes of Allan Cunningham" by J. H. Maiden and R. H. Cambage, *Journ. & Proc. Roy. Soc. N.S.W.* for 1909, Vol. 43, Part II, pp. 123-128, 1909.

PAPUA. Map of the Territory of Papua. From the latest Surveys. 1909. 32 miles to an inch (1:12,027,520). $4^{\circ} - 12^{\circ} S.$; $140^{\circ} - 155^{\circ} E.$ 8 colors. With two insets: (1) Samarai (Dinner Island), 8 chains to an inch (1:53,360). $10^{\circ}45' S.$ and $150^{\circ}45' E.$. (2) Port Moresby, Eastern Side Showing Surveyed Townships, etc. One mile to an inch (1:53,360). $9^{\circ}27^{\circ} S.$ and $147^{\circ}9' E.$. Accompanies, in pocket, "Handbook of the Territory of Papua, compiled by the Hon. Stanforth Smith, Administrator," and edition, Melbourne, 1909.

[Valuable large-scale official map. Shows, by colors, administrative divisions.]

EUROPE

AUSTRIA-HUNGARY. A Magyar Birodalom Közigazgatói Térképe (Staatsrechtliche Karte des Ungarischen Reiches). 1:1,000,000 (1 in.=15.78 miles). $40^{\circ} - 42^{\circ} N.$; $14^{\circ} - 26^{\circ} E.$ 3 colors. Accompanies note with same title by R. Harass, *Bull. Hungarian Geogr. Soc.*, Internat. Edit., Vol. 37, pp. 325-327, 1911.

[Shows boundary of Kingdom of Hungary according to claims which would include Dalmatia, Bosnia and Herzegovina. Map on larger scale than necessary for the purpose, it being a wall map.]

AUSTRIA-HUNGARY. Geologische Übersichtskarte der Umgebung von Hermannstadt. 1:75,000 (1 in.=1.18 mile). $45^{\circ}52' - 45^{\circ}45' N.$; $24^{\circ}0' - 24^{\circ}15' E.$ 6 colors. Accompanies, facing p. 42, "Beiträge zur Geologie der Zibinschebene bei Hermannstadt" by O. Phleps, *Verh. u. Mitt. Siebenbürg. Ver. f. Naturw. zu Hermannstadt*, Vol. 58 (1908), pp. 41-59, 1909.

AUSTRIA-HUNGARY. (a) Isohypsenkarte der Umgebung des Szt. Anna-Sees. 1:50,000 (1 in.=0.79 mile). $46^{\circ}8' N.$ and $25^{\circ}53' E.$.

(b) Isoethenkarte des St. Anna-Sees. [1:12,000 (1 in.=166.7 ft.)]. Accompany, as Abb. 7 on p. 103 and Fig. 9 (Taf. XII) facing p. 104, "Der Szt. Anna-See" by J. v. Gelei, *Bull. Hungarian Geogr. Soc.*, Internat. Edit., Vol. 37, pp. 96-118, 1911.

[On map (b) isobath interval 1 meter.]

AUSTRIA-HUNGARY. (a) Carte des environs de Titel. 1:300,000 (1 in.=4.73 miles). $45^{\circ}45' N.$ and $20^{\circ}45' E.$

(b) Les environs du confluent du Danube et de la Tisza. Carte morphologique. 1:1,750,000 (1 in.=27.62 miles). $46^{\circ}12' - 44^{\circ}32' N.$; $18^{\circ}30' - 21^{\circ}5' E.$

Accompany, as Figs. 8 and 9 on pp. 277 and 279, "Compte-rendu du troisième Congrès d'Itinérant de la Société Hongroise de Géographie" by E. de Cholnoky, *Bull. Hungarian Geogr. Soc.*, Internat. Edit., Vol. 37, pp. 275-288, 1911.

AUSTRIA-HUNGARY. Die Geographische Verteilung der Gewitter in Ungarn. [1:5,000,000 approx. (1 in.=78.9 miles)]. Accompanies, as Fig. 1 on p. 302, paper with same title by E. Héjas, *Bull. Hungarian Geogr. Soc.*, Internat. Edit., Vol. 37, pp. 296-309, 1911.

[Cartogram showing distribution of thunderstorms by quadrangles of $30'$ in lat. and 1° in long. Thirteen degrees of frequency shown.]

AUSTRIA-HUNGARY. (a) [Map of Part of the Görgény Mountains]. [No scale. 1:100,000 approx. (1 in.=1.6 miles)]. [46°45' - 46°30' N.; 24°50' - 25°20' E.].

(b) Geologische Kartenskizze der Mezőhavas Masse. 1:300,000 (1 in.=.4.73 miles). [Mezőhavas in 46°41' N. and 25°14' E.].

Accompany, as Taf. XIV facing p. 118 and Abb. 2 on p. 121, "Über das Görgény-Gebirge" by A. Radványi, *Bull. Hungarian Geogr. Soc.*, Internat. Edit., Vol. 37, pp. 118-137, 1911.

[On map (a) relief in contours; interval 100 meters. Limit of cereals, of the vine and of certain trees shown.]

AUSTRIA-HUNGARY. (a) Geologische Skizze des Zempléner Klippengebirges. [1:93,000 approx. (1 in.=1.3 miles approx.)]. [48°55' N. and 21°50' E.].

(b) Topographische Kartenskizze des Zempléner Klippengebirges. [No scale. 1:100,000 approx. (1 in.=1.6 miles approx.)]. Same coordinates.

Accompany, as Abb. 3 and 6 on pp. 149 and 163, "Die Morphologie des Zempléner Klippengebirges" by G. Strömpl, *Bull. Hungarian Geogr. Soc.*, Internat. Edit., Vol. 37, pp. 144-180, 1911.

AUSTRIA-HUNGARY. (Tatra). (a) Cirque de Gasiennicow Stawy levé à la règle à éclimètre et dessiné par Mathias Koncza, novembre 1907. Équidistance 10 m. 1:10,000 (1 in.=.0.16 mile). [49°14' N. and 20°0' E.].

(b) Cirques de Koscielisko levé à la règle à éclimètre et dessiné par Mathias Koncza, novembre 1907. Équidistance 5 m. 1:5,000 (1 in.=.41.7 ft.). [49°14' N. and 20°2' E.].

(c) Sondage du Lac Czerwony Staw levé sur la glace avec un décamètre et dessiné par Mathias Koncza, novembre 1907. Équidistance 2 m. Alt. 1672 m. 1:2,000 (1 in.=.16.7 ft.). [49°11' N. and 19°53' E.].

Accompany "Les Cirques de Montagne (Alpes fribourgeoises et Tatra)" by M. Koncza, in "Études de Géographie Physique sur le Canton de Fribourg," *Mém. Soc. fribourgeoise Scien. Nat.*, Vol. 7, pp. 149-196, 1910.

ENGLAND. Bartholomew's "Quarter Inch to Mile" Contour Road Map of the Environs of London. 1:253,440=4 miles to an inch. [51°53' - 51°46' N.; 1°23' W. - 1°29' E.]. 11 colors. John Bartholomew & Co., Edinburgh. Price, in case, paper 1/6, on cloth 2/6, on cloth, dissected, 3/-. [This new map is reduced from the corresponding sheets of Bartholomew's well-known half-inch-to-the-mile maps of Great Britain. Relief, as on the larger scale maps, is represented by the 'layer' method of coloring. Eight tints are used on land ranging from a pleasing olive green to brown, and two tints on sea. The main roads are prominently brought out in red. The map, in content and execution is of the usual high standard of excellence of the products of the Edinburgh Geographical Institute. It is admirably suited to all touristic purposes.]

EUROPE. Map [of Europe] Showing the Positions of the Meteorological Stations the observations from which are used in the preparation of the [British] daily weather report. [1:20,000,000 (1 in.=315.65 miles)]. Accompanies, as Fig. 13, facing p. 102, *Sixth Ann. Rep. Meteorol. Committee* for the year ending 31st March, 1911. [Blue Book Cd. 5810]. 1911.

[Shows areas from which wireless reports are received within 2 and within 24 hours of the time at which the observations were made. See also *Bull.*, Vol. 43, p. 80, 1911.]

GERMANY. Die räumliche Entwicklung Posen. 1:50,000 (1 in.=.79 mile). [52°25' N. and 17° E.]. Accompanies, on p. 173, paper with similar title by O. Dälchow, *Geogr. Anzeig.*, Vol. 12, pp. 169-173, 1911.

[Suggestive map of the city of Posen indicating by what areas it has gradually been enlarged].

GERMANY. Die verkehrsgeographische Bedeutung der deutschen Reichsgrenze. [1:5,000,000 (1 in.=78.91 miles)]. 56½° - 44½° N.; 0° - 24° E. 2 colors. Accompanies, as Sonderbeil. 59, paper with similar title by E. Schmidt, *Geogr. Anzeig.*, Vol. 12, pp. 150-152 and 175-178, 1911.

[Shows main railroad lines and points where other lines of communication cross the boundary.]

GERMANY. [Map showing the glacial geology of the region between the Elbe and Lübeck]. 1:400,000 (1 in.=6.31 miles). [53°55' - 53°20' N.; 10°20' - 11°0' E.]. Accompanies, on p. 180, "Die Entstehung des Travertines" by C. Gagel, *Jahrb. kgl. Preussischen Geol. Landesanstalt* für 1910, Vol. 31, Part II, pp. 168-192, 1910.

GERMANY. Verbreitung der Salzflora in Anhalt, Provinz-Sachsen und Mark Brandenburg. 1:750,000 (1 in.=11.84 miles). 52°45' - 51°25' N.; 11° - 14° E. 1 color. Accompanies, as Taf. I, "Salzflora und Tektonik in Anhalt, Sachsen und Brandenburg" by O. v. Linstow, *Jahrb. kgl. Preussischen Geol. Landesanstalt* für 1910, Vol. 31, Part II, pp. 23-37, 1910.

GERMANY. Geologische Karte des Dammersfeldes in der Rhön und seiner südwestlichen Umgebung bearbeitet von O. Drehe. 1:50,000 (1 in.=.79 mile). [50°24' N. and 9°50' E.]. 20 colors. Accompanies, as Tafel II, "Geologische Beschreibung des Dammersfeldes, etc." by O. Drehe, *Jahrb. kgl. Preussischen Geol. Landesanstalt* für 1910, Vol. 31, Part II, pp. 297-342, 1910.

GERMANY. Geologische Übersichtskarte der Warburger Störungszone. 1:40,000 (1 in.=.63 mile). 51°30' - 51°26' N.; 9°7' - 9°55' E. 20 colors. Accompanies, as Taf. 12, "Der Warburger Sattel, etc." by A. Kraiss, *Jahrb. kgl. Preussischen Geol. Landesanstalt* für 1910, Vol. 31, Part II, pp. 377-419, 1910.

GREAT BRITAIN AND IRELAND. (a) Map Showing Positions of the Climatological Stations. (b) Map Showing the Positions of the Stations having Self-Recording Instruments. Both maps 1:5,000,000 (1 in.=78.91 miles). 61° - 49° N.; 12° W. - 4° E. Accompany, as Figs. 11 and 12 between pp. 80 and 81, *Sixth Ann. Rep. Meteorol. Committee* for the year ending 31st March, 1911. [Blue Book Cd. 5810]. London, 1911.

[For comment see *Bull.*, Vol. 43, p. 80, 1911.]

GREAT BRITAIN AND IRELAND. (a) [Thirteen maps of Great Britain and Ireland accompanying "The Building of the British Isles" by A. J. Jukes-Browne, 3rd edit., London, 1911, showing the distribution of land and sea through geologic history. All maps, except where noted differently below: 1:50,000,000 approx. (1 in.=142.0 miles approx.). 60° - 48° N.; 1° W. - 2½° E. 1 color. (1) Ordovician Time (Arenig). Fig. 10, facing p. 78. (2) Silurian Time (Llandovery). Fig. 13, facing p. 96. (3) Lower Devonian Time. Fig. 19, facing p. 128. (4) Lower Carboniferous Time. Fig. 23, facing p. 158. (5) Permian Time. Fig. 31, facing p. 210. (6) The Bunter Epoch. Fig. 34, facing p. 230. (7) The Keuper Epoch. Fig. 37, facing p. 248. (8) Great Oolite Time. Fig. 44, facing p. 274. (9) Portlandian Time. [60° - 48° N.; 9½° W. - 4° E.]. Fig. 46,

facing p. 288. (10) Selbornian Time. [60° - 48° N.; 0° W. - 5° E.]. Fig. 51, facing p. 324. (11) Late Senonian Time. Fig. 53, facing p. 333. (12) London Clay and of Lutetian Times. Fig. 57, facing p. 350. (13) Upper Pliocene Time. Fig. 72, facing p. 422.

(b) [Two maps of lands bordering the English Channel accompanying same work, viz.: (1) Geography of the Oligocene Period. [173,600,000 approx. (1 in.=56.8 miles approx.). [51°40' - 48°0' N.; 2°40' W. - 5°20' E.]. 1 color. Fig. 58, facing p. 358. (2) Geography of Lower Pliocene Time. [175,500,000 approx. (1 in.=56.8 miles approx.). [53°20' - 48°0' N.; 6°40' W. - 5°5' E.]. 1 color.

GREAT BRITAIN AND IRELAND. [Map of Census Returns 1911. Great Britain and Ireland]. 1:8,000,000, or 1 in.=126.25 miles. Accompanies, on p. 308, "Some Recent Census Returns" (first part) by O. J. R. Howarth, *Geogr. Journ.*, Vol. 38, pp. 396-404, 1911.

[Shows increase or decrease of population by counties or groups of counties for the decades 1891-1901 and 1901-1911.]

MONTENEGRO. Monténégro. [1:1,400,000 approx. (1 in.=22.1 miles approx.). 43°40' - 41°40' N.; 18°20' - 20°10' E. Accompanies, on p. 41, "Le Royaume de Monténégro," by M. C. Verloep, Paris, 1911.

[Shows chief roads and telegraph stations.]

NETHERLANDS-GERMANY. Overzichtskaat van de tot heden bekende Veenbruggen in Nederland en N. W. Duitschland. 1:2,000,000 (1 in.=31.56 miles). [54° - 51½° N.; 51½° - 9° E.]. Accompanies, as Fig. 1, on p. 809, "Veenbruggen en de Nieuw Ontdekte Buinerbrug" by J. A. Mulder, *Tijds. Kon. Nederl. Aardr. Genoot.*, Vol. 28, pp. 801-820, 1911.

[Refers to 'bridges' across the fens of Frisia resembling corduroy roads. Their origin is undetermined.]

SWITZERLAND. (a) Cirque de Oberhaus (Kaiseregg) levé à la règle à échelle et dessiné par Mathias Koncza. Juillet 1907. Équidistance 5 m. 1:5,000. [40°40' N. and 7°25' E.].

(b) Cirque de la Chambre aux Chamois levé à la règle à échelle et dessiné par Mathias Koncza. Juillet 1907. Équidistance 5 m. 1:5,000. [40°40' N. and 7°15' E.].

(c) Cirque de Brequezzaz-Kessel levé à la règle à échelle et dessiné par Mathias Koncza. Juillet 1907. Équidistance 5 m. 1:5,000. [40°41' N. and 7°16' E.].

Accompany "Les Cirques de Montagne (Alpes fribourgeoises et Tatra)," by M. Koncza in "Études de Géographie Physique sur le Canton de Fribourg," *Mém. Soc. fribourg. Scien. Nat.*, Vol. 7, pp. 149-196, 1910.

SWITZERLAND. Trois "boucles" de la Sarine. Levé à la règle à échelle par Cesare Calciati. Juillet 1907. 1:10,000. (1 in.=0.16 mile). [46°46' N. and 7°5' E.]. Superimposed on tracing paper: Un des anciens Cours hypothétiques de la Sarine approximativement représenté. Accompanies "Les Méandres de la Sarine" by C. Calciati in "Études de Géographie Physique sur le Canton de Fribourg," *Mém. Soc. fribourg. Scien. Nat.*, Vol. 7, pp. 85-146, 1910.

SWITZERLAND. Têtes de ravins du Rio du Petit Rome et du Lavapesson. 1:10,000. (1 in.=0.19 mile). [46°47' N. and 7°8' E.]. Accompanies, on pp. xxiv and xxv, "Ravins et Têtes de Ravins" by L. J. Romain in "Études de Géographie Physique sur le Canton de Fribourg," *Mém. Soc. fribourg. Scien. Nat.*, Vol. 7, pp. xv-xxxv, 1910.

SWITZERLAND. [Five maps accompanying "Les 'Coudes de Capture' du pays fribourgeois" by G. Michel, in "Études de Géographie Physique sur le Canton de Fribourg," *Mém. Soc. fribourg. Scien. Nat.*, Vol. 7, pp. 1-84, 1910.]

(a) Carte hypsométrique de la région de l'ancien prolongement nord-est de la chaîne de collines de la Faye. 1:100,000. (1 in.=1.58 miles). [46°53' - 46°48' N.; 7°7' - 7°17' E.]. Fig. 4 on p. 18.

(b) État ancien de la Vallée du Tigelet-Lavapesson. [No scale. 1:75,000 approx. (1 in.=1.2 miles approx.). [46°50' N. and 7°6' E.]. Fig. 8 on p. 25.

(c) Topographie glaciaire du bassin supérieur de la Crausa. 1:15,000. (1 in.=0.24 mile). Fig. 10 on p. 30.

(d) Ancien cours de la Taferna. 1:100,000. [46°51' - 46°45' N.; 7°9' - 7°18' E.]. Fig. 16 on p. 49.

(e) Rapport ancien des bassins de la Sarine et de l'Aar. [No scale. 1:600,000 approx. (1 in.=9.5 miles approx.). [46°43' - 47°15' N.; 7°5' - 7°40' E.]. Fig. 21 on p. 63.

WORLD AND LARGER PARTS THEREOF.

NORTH AMERICA AND EUROPE. Map showing Glaciated Areas in North America and Europe. [1:100,000,000 approx. (1 in.=1578 miles approx.). [90° - 20° N.; 135° W. - 70° E.]. Accompanies, as Fig. 123 facing p. 445, "The Ice Age in North America" (5th Edition) by G. F. Wright, Oberlin, O., 1911.

PART OF NORTHERN HEMISPHERE. Map of Portion of Land Hemisphere Showing Paleozoic land connections and paths of marine faunal migrations. [1:160,000,000 approx. (1 in.=2525 miles approx.). Accompanies, as Fig. 19 on p. 484, "Revision of the Paleozoic Systems" by E. O. Ulrich, *Bull. Geol. Soc. Amer.*, Vol. 22, pp. 281-680, 1911.

WORLD. (a) [Map of the World showing present distribution of the genera *Acræa*, *Melanitis*, *Mycalesis* and of the family *Varanidae* in relation to the extent of the Late Paleozoic or Early Mesozoic Continent]. Mollweide's projection [1:103,000,000 approx. (1 in.=3046.0 miles approx.).]

(b) Map of the World showing present distribution of the *Terias Catopsilia* and *Ambullaria* and of the *Tetastelidæ* in relation to the extent of the Equatorial Mesozoic Continent (after Schuchert, Lapparent and Lull). Same projection and scale.

Accompany, on pp. 415 and 417, "Zoogeography" (review of Bartholomew's Atlas of Zoogeography) by H. O. F., *Geogr. Journ.*, Vol. 38, pp. 413-419, 1911.

WORLD. Vie di Comunicazione Mondali. [Mercator projection: equatorial scale 1:192,000,000 approx.]. 13 colors. With two insets on Mercator projection, 1:600,000,000 approx., showing distribution of races and of religions. Accompanies, facing p. 101, "Le Grandi Comunicazioni di Terra e di Mare" by L. Giannitrapani, Bologna, 1911.

[Shows clearly principal steamship routes with time of passage and the chief railroad lines.]

WORLD. The World's Telegraphic System, 1911. [Mercator projection: equatorial scale 1:90,000,000 approx.]. No map net. 1 color. Accompanies, facing p. 541, "Imperial Telegraphs" by C. Bright, *United Empire*, Vol. 2 (New Series), pp. 541-552, 1911.

[Distinguishes between non-British and all-British submarine cables. Shows proposed British cables.]

OCEANOGRAPHICAL

NORTH ATLANTIC OCEAN. (a) Carte Montrant la Distribution de la Température à la Profondeur de 1,000 Mètres et à celle de 50 Mètres à l'Époque du Frai des Principales Gadides (Printemps). Dressée par M. I. N. Nielsen. [1:100,000,000 approx. (1 in.=315.7 miles approx.)]. 69°-43° N.; 35° W.-2° E.

(b) *Gadus Poutassou*. Carte Montrant la Différence d'Extension entre la Zone où Fraie une Espèce et son Aire de Distribution. [1:36,600,000 approx. (1 in.=580.2 miles approx.)]. 73°-47° N.; 33° W.-30° E.

Accompany, as Figs. 16 and 17 on pp. 184 and 185, note on "Distribution des lieux de ponte des Gadides dans l'Atlantique nord" by L. Laloy, *La Géogr.*, Vol. 24, pp. 183-186, 1911, based on paper on same subject by J. Schmidt in *Rapp. et proc. verb. du Conseil Internat. pour l'explor. de la mer*, Vol. 10, 1909, from which the maps are taken.

CARTOGRAPHICAL

FRANCE. Un dessin-modèle du rocher en haute montagne: le Cirque du Creux Noir (Vanoise). Extrait du 25^e Cahier du Service Géographique de l'Armée (France): Les Erreurs de la Carte de France par le Général H. Berthaut, planche XIX. 1:10 900 (1 in.=0.16 mile). [45°24' N. and 6°45' E.]. Accompanies, as Fig. 1 on p. 18, "La Méthode de l'Échantillonnage Topographique au Service de la Morphologie" by J. Brunhes, introduction to "Études de Géographie Physique sur le Canton de Fribourg", *Mém. Soc. Fribourg. Scien. Nat.*, Vol. 7, pp. iii-xiii, 1910.

[Exemplary in its treatment of bare rock on high mountain summits. Recommended by Prof. Brunhes to his students as a model topographic basis for detailed physiographic type studies.]

ITALY. [Three sections of the Map of Italy, 1:100,000 (1 in.=1.58 miles), showing different editions, together with plates of conventional signs:] (1) Tipo dell' Edizione in Nero con l'Orografia a Curve e Tratteggio. (2) Tipo dell' Edizione Policroma con l'Orografia a Curve e Sfumo. 5 colors. (3) Tipo della Nuova Carta. 6 colors. (4) Segni Convenzionali della Nuova Carta. 3 colors. Accompany, as Tav. I, II, IV and III, "La Nuova Carta d'Italia al 100,000 del nostro Istituto Geografico Militare" by Capt. L. Giannitrapani, *Boll. Soc. Geogr. Italiana*, Vol. 12, pp. 1190-1203, 1911.

[The principal innovation on the new map is that the system of roads is brought out prominently in red. Distinction is made between four classes of roads. Relief is represented by brown contours, rendered plastic by hill-shading. Drainage in blue, woods in green areal coloring.]

TURKEY IN ASIA. Studie zu Dr. Viktor Pietschmanns photogrammetrischen Aufnahmen in Mesopotamien vom techn. Oberoffizial Ignaz Tschamler. Wien, Juni 1911. 1:10,000 (1 in.=0.16 mile). Accompanies, as Taf. XVI, paper with same title by same author, *Mitt. k.k. geogr. Gesell. in Wien*, Vol. 54, pp. 400-431, 1911.

[Map deduced from three photographic views. Dr. Pietschmann's results admirably demonstrate the feasibility and value of photo-topographic methods in exploratory surveys.]

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INDEX TO VOL. XLIII.

rev. Denotes Reviews; *n.* Short Notices and Comment on Maps;

*Bibliographical Entry.

Maps are indexed under their respective Countries.

- A.
- Aanwinsten. Catalogus der Koloniale Bibliotheek . . . Kon. Inst. vaar de Taal, Land en Volkenk. Ned. Indië, 156*
- Abdul Hamid II. Le Sultan, l'Islam et les Puissances. V. Bérard, *rev.*, 699
- Abendanon, E. C. Breukenkust van Mandar, 637*; Celebes en Halmahera, 224*; Expedition der Kgl. Niederländ. Geogr. Gesellschaft nach Zentralcelebes, 1909-10, 792*; Map, 549*; — and W. Schiebel. Reizen door Centraal-Celebes (Map), 549*
- Abitibi, Une Expédition dans. F. Laliberté, 715* ¶ Maps of: Abitibi Region indicating surveyed Townships traversed by the Transcontinental R.R., etc., *n.*, 633; Vicinity of the National Transcontinental R.R., 633*
- Abraham, G. D. British Mountain Climbs, *n.*, 701; Swiss Mountain Climbs, *n.*, 701
- Abruzzi, In the. A. Macdonnel, *n.*, 702
- Abruzzi, H. R. H. Duke of the. Expedition to the Karakoram. F. de Filippi, 225*
- Abyssinia. See also Ethiopia: ¶ In Abyssinia. C. A. Annaratone, 869*; Aridity, Salt Deposits and Currency. A. Tancredi, 692; Criminali, giudici e tribunali etiopici. L. de Castro, 636*; In Dancalia ed in Abissinia. M. Lega, 636*; Zur Geschichte der äthiopischen Eisenbahnen. A. Ilg, 67*; Innerpolitischen Verhältnisse Abessinien, 153*; Une nouvelle fondation aux Pays Gallas. R. P. Cyprien, 67*; Principali studi pubblicati in occasione della missione Duchesne-Fournet in. C. C. Rossini, 67*; Reise nach Harar und Adis Abeba. F. J. Bieber, 67* ¶ Map of Abyssinia: Recent Surveys in Southern, 797*
- Aconcagua, Penitentesschneefelder Gebiet zwischen — und Tupungato. Dr. F. Reichert, 475*
- Acre, Territoire fédéral l' — et la ligne du Madeira au Mamoré. P. Walle, 636*
- Adam, J. W. H. Weltkarte der Erzlagerstätten, *n.*, 80
- Adamaoua, Bericht über eine Bereisung des Ostgrenzgebietes der Residentur —. K. Strümpell, 555*
- Adamellogruppe, ein alpinen Zentralmassiv, und seine Bedeutung für Gebirgsbildung und unsere Kenntnis von dem Mechanismus der Intrusionen. W. Salomon, 478*
- Adams, C. C. Foundations of Economic Progress in Tropical Africa, 753
- Adams, F. The Banana and its Relatives, 794*
- Adams, F. D., and A. E. Barlow. Geology of Haliburton and Bancroft Areas, Ontario, 66*
- Addis Abeba: Reise nach Harar und Adis Ababa. F. J. Bieber, 67*
- Adelaide Chamber of Commerce, Sixtieth Annual Report of, 226*
- Aden Hinterland, Geology of. Capt. R. E. Lloyd, 70*
- Adirondack Region, Sketch Map of S. E. — showing relation of preglacial drainage to that of the present, 795*
- Adler, B. F. Maps of Primitive Peoples [in Russian], 316*; Résumé in English, 669
- Adrar, De l' — à la Baie du Lévrier. Lieut. Mugnier-Pollet, 556* ¶ Map of Adrar: Itinéraire du Capitaine Cortier dans, 79*
- Adriatic Sea: ¶ Italienisch-österreichische Projekt einer gemeinsamen Erforschung des Adriatischen Meeres. Dr. E. Brückner, 73*; Erforschung des Adriatischen Meeres. Prof. Dr. A. Grund, 718*; Vorläufiger Bericht über die erste Kreuzungsfahrt *Najade* in der Hochsee der. Prof. Dr. E. Brückner, 718* ¶ Map of Adriatic Sea: Temperatur der Meeresoberfläche und der Luft, 551*

- Aeronautics:** ¶Aviation and Aeroplanes. Capt. I. W. Chambers, 635*; Aeronautics and Climate, 624; Aviation Cartography, 779; Les grandes routes de l'air, 794*; Maps for Aeronauts, 203; Maps for Airships. C. Lallemand, 922
- Afghanistan:** Bahnprojekt. Dr. E. Zugmayer, 155*
- Africa:** ¶Africa. Being an Accurate Description of the regions of Aegypt, Barbary, Lybia, Abyssines, etc. Collected and Translated from most Authentick Authors by John Ogilby (1670), 319*; Big Game of. R. Tjader, *rev.*, 302; Catalogue of Fresh-Water Fishes of — in the British Museum. G. A. Boulenger, Vol. I, 314*; Vol. II, 800*; Les divisions phytogéographiques de l'Afrique. Prof. Dr. Engler, 67*; Lieut. Boyd Alexander's Exped., 55; Prince Henry of Portugal and the African Crusade of Fifteenth Century. C. R. Beazley, 317*; Prof. H. Meyer Returns to, 526; Transkontinentale Bahnen und die Kap-Kairo-Linie. Dr. R. Hermann, 153*; Le Transafrican de Matadi à Dar-es-Salam. A. J. Wauters, 716*; Voyage to the Coast of Africa in 1758. J. Lindsay, 400* ¶Maps of Africa: Vegetation. Dr. M. Hardy, *n.*, 80; Goode's Base Map, *n.*, 712; Isotherms for Africa, *n.*, 707; Map of — [in Arabic], *n.*, 159; Maps showing territories in which various types of bows are used, 707*
- Central Africa:** ¶Beiträge zur Anthropologie von Zentral-Afrika. J. Czekanowski, 68*; Commerce tripolitaïn dans le centre africain. J. Etiévant, 69*; Duke of Mecklenburg's Expedition, 855; In the Heart of Africa. Duke Adolphus Frederick of Mecklenburg, *rev.*, 863; Living Speech in — and South Africa. Essay Introductory to Bantu Family of Languages. A. C. Madan, *rev.*, 925; Wild and Wilde im Herzen Afrikas. H. Schomburgk, *n.*, 926 ¶Maps of Central Africa: Dr. Karl Kumm's Route, 472*; Route of the Expedition of the Duke of Mecklenburg, 1907-08, 955*
- East Africa, Map:** Karte der Eisenbahnen in Ost-Afrika, *n.*, 78
- North Africa:** ¶Les Blancs d'Afrique. Dr. H. Weisgerber, *n.*, 64 ¶Map of North Africa: Der Orient. E. Banse, *n.*, 78
- South Africa:** ¶Application of Science to the Ostrich Industry. Prof. J. E. Duerden, 396*; Archæological Discoveries of Dr. C. Peters, 55; Climate and Rainfall of. R. T. A. Inness, 197; Gravity in. R. A. Lehfeldt, 791*; Introduction d'industries nouvelles dans l'Afrique australe, 315*; Marine Investigation in —. Vol. V., *n.*, 64; Mystery of Zimbabwe. F. A. Edwards, 951*; Pre-Historic Period in. J. P. Johnson, *rev.*, 537; Railway Projects in, 155*; Report of Magnetic Survey of. J. C. Beattie, *n.*, 926; Dans le Sud-Africain et au seuil de l'Afrique Centrale. A. Bertrand, *n.*, 927; Yellow and Dark-Skinned People of Africa South of the Zambesi. G. M. Theall, *rev.*, 537 ¶Maps of South Africa: Mafeking. Portion of Marico and Lichtenburg Districts, Zeerust. Portions of Marico, Rustenburg and Lichtenburg Districts, 159*; South Africa Showing Railways, *n.*, 79
- South West Africa:** ¶On Collection of Dried Plants obtained . . . by Percy Sladen Memorial Expeditions, 1908-11. H. H. W. Pearson, 717*
- Tropical Africa:** ¶Foundations of Economic Progress in. C. C. Adams, 753
- West Africa:** ¶Beitrag zur Kenntniss des Klimas von Salaga, Togo und der Goldküste. G. A. Krause, 950*; Mission en Afrique Occidentale. Des pays Touareg du Niger à la Côte de l'Or par le Haut-Togo. G. de Gironcourt, 950*; Railroads in West Africa, 54; Recent Developments in. J. A. Cooper, 69*
- British Colonies in Africa:** ¶Angleterre en Afrique. Capt. E. de Renty, *n.*, 781; Britain Across the Seas. Africa. History and Description, etc. Sir Harry Johnston, *rev.*, 375; Colonies anglaises d'Afrique, 68*
- British East Africa:** ¶African Game Trails. T. Roosevelt, *rev.*, 205; Die Masai. Ethnographische Monographie eines ostafrikanischen Semitenvolkes. M. Merker, *rev.*, 928; Hunting Adventures in the Big Game Country. J. T. McCutcheon, *n.*, 375; Topographic Surveys in, 289 ¶Maps of British East Africa: East Africa Protectorate. Maps to show area covered by triang. and top. survey, 310*; East Africa Protectorate: Mangua; Takaungu, *n.*, 471; Duke of Mecklenburg Expedition's field Work. Lieut. M. Weiss, *n.*, 956; Sheet Malindi and Surrounding Country, 708*; ¶Map: Allgemeine Übersichtsskizze der Wohngebiete des Masaivolkcs,

956*; Sketch of country between Juba R. and Lake Rudolf, 876*

Union of South Africa (British South Africa): ¶ Directors Report and Accounts for 1910, 555*; A Nation in the Making. A. L. Smith, 791*; Proceedings of Geol. Soc. of South Africa, 1910, 637*; Report of Geol. Surv. for 1909, 315*; Union of South Africa. The Hon. R. H. Brand, *rev.*, 205

French Colonies in Africa: ¶ Coup d'œil sur les explorations en Afrique au début du XX^e siècle, etc. Baron Hulot, 869*

French Equatorial Africa: ¶ Afrique équatoriale. Situation générale, 869*; Le Bassin de l'Ombella. R. Cuvillier-Fleury, 791*; Exploration de la rivière N'Goinde. E. Mallet, 476*; French Mission to Lake Chad. Capt. J. Tilho, 223*; Grands travaux au Congo Français, 154*; MacLeod Falls on the Mao Kabi. P. A. Talbot, 637*; Mise en valeur du Territoire du Tchad. Lieut.-Col. H. Mill, 223*; Le Nomadisme des "Fangs." L. Martrou, 314*; Organisation militaire de l'Afrique Équatoriale. Col. Goullet, 395*; Rapport sur le fonctionnement du laboratoire de Brazzaville depuis 1906. [Sleeping Sickness Investigations.] Heckenroth, 791*; Reconnaissances sur l'Ogowé. J. Dubrouillet, 555*; Résultats scientifiques de la mission Tilho. Ch. Lallemand, 223*; Situation générale de l'Afrique Équatoriale Française. Gov. Gen. Merlin, 154*; Statistiques du Commerce . . . 1908. Congo français et Dépendances, 555*; Statistiques de l'Industrie Minière . . . 1908. Congo français et Dépendances, 791*; Voyage au Congo (1909). M. A. de Romeu, 314*

French West Africa: ¶ L'Afrique Occidentale Française et la Nigeria Anglaise. B. de l'Escale, 68*; Le Commerce en 1909. C. Rabot, 314*; De l'Atlantique au Tchad et au Borkou. (Mission Tilho). Lieut. M. Mercadier, 476*; Cacao en, 154*; Chemin de fer de Konakry au Niger. A. Terrier, 154*; Commercial Development, 68*; Confréries musulmanes et le Maraboutisme dans les pays de Sénégal et du Niger. M. Delafosse, 716*; Essor de l'Afrique Occidentale Française. A. Terrier, 716*; Du Guir à la Mauritanie. Le capitaine Doury, 476*; Mission du Colonel Mangin, 1910, 223*; Mission industrielle et commerciale en Afrique Occid. Franç. Cap. Schiffer, 154*;

Mission Chevalier, 154*; Populations géophages de l'Afrique Occidentale. H. Hubert, 716*; Situation générale, etc. Gov.-Gen. Ponty, 68*; Statistiques du Commerce, 1908, 556*, 716*; — de l'industrie minière, 1908, Exploitation de l'or, 793* ¶ Maps of French West Africa: Carte de l'Afrique Occidentale Française. Feuille 2. Tombouctou, 797*; Carte démographique de, 472*; Carte du Réseau complet des chemins de fer projetées en, 797*

German Colonies in Africa: ¶ Eisenbahnbau, 396*; Handel der afrikanischen Kolonien und Samoas, 1909, 68*; Wirtschaftlichen Fortschritte unserer afrikanischen Kolonien. Maj. W. Langfeld, 791*

German East Africa: ¶ Über Baumwollkultur in Deutsch-Ostafrika, 791*; Cotton growing in. L. Hamilton, 869*; Expedition of the Hamburg Geog. Soc., 856; Destruction of Telegraph Lines by Giraffes, 289; Deutsche Tanganjika-Njassa-Gebiet. E. Zimmermann, 68*; East African Central Railroad, 368; Geological Expedition to East African Rift Valleys, 856; Wie evangelische Missionare unsere Neger arbeiten lehren. K. Axenfeld, 637*; Zur Geologie und Hydrologie von Darassalam und Tanga. W. Koert und F. Tornau, *n.*, 927; Heissen Quellen von Mt. Katagata in Karagwe. E. Fr. Kirschstein, 154*; Das Hochland der Riesenkrater und die umliegenden Hochländer Deutsch Ostafrikas. Teil I. Dr. F. Jaeger, 716*; Kautschukkultur in Deutsch-Ostafrika, 154*; Mit Lindequist durch Ostafrika. Maj. A. D. Schlobach, 68*; Meteorologische Beobachtungen aus Deutsch-Ostafrika. Dr. P. Heidke, 154*; Prof. H. Meyer returns to, 288; Sisalkultur in Deutsch-Ostafrika, 68*, 315*; Ueber Rindviehzucht in unserer Kolonie, 869*; Wirtschaftliche Entwicklung des südwestlichen Deutsch-Ostafrika. E. Zimmermann, 315*; Aux Sources du Nil. Dans la région des volcans du Lac Albert-Edouard et du Ruwenzori. Lieut. G. Vervloet, 556* ¶ Maps of German East Africa: Abflusslose Rumpfschollenland zwischen Iramba, Njarasasee, Umbugwe und Ufiome. F. Jaeger u. W. Rux, *n.*, 548; Expedition's field Work (Duke of Mecklenburg's) Lieut. M. Weiss, *n.*, 956; Hochland der Riesenkrater und die südlich anschliessenden Gegenden bis zum Hanang, usw. F.

Jaeger und W. Rux, *n.*, 547; Karte des besiedelten Gebietes der Landschaft Turu. R. Schultze, *n.*, 797; Massai-Reservat südlich des Kilimandscharo, *n.*, 159; Neue Grenze zwischen Belgisch-Kongo u. Deutsch Ost-Afrika, 547*; Skizze von Daresalam mit den in den Jahren 1901-5 ausgeführten Bohrungen, 956*; Skizze der Hamitischen Sprachgebiete in Aequatorial-Ostafrika. B. Struck, *n.*, 548; Allgemeine Übersichtsskizze der Wohngebiete des Masaivolkcs, 956*; Skizze von Tanga mit den in 1902-3 ausgeführten Bohrungen, 956*; Skizze von Unjangwira und den Nachbargebieten. Maj. v. Prittwitz u. Gaffron, *n.*, 797

German Southwest Africa: ¶Ackerbau in Deutsch-Südwestafrika. Dr. Golf, 637*; Arbeiten und Aufgaben in. Prof. E. A. Fabarius, 791*; Buschleute der Namib, ihre Rechtsverhältnisse. Oberleut. Trenk, 154*; Denkschrift des Gouvernements von — über Rinderzucht des, 950*; Die deutsche Süd-Kalahari. Dr. P. Range, 869*; Erforschung der Namib. Dr. Kleinkemmer-Kettwig, 69*; Erkundung der Hunsberge. Lieut. Drews, 396*; Die Fischerei an Westküste Süd-Afrikas, *n.*, 206; Im Gebiet der Etoshapfanne. D. Hutter, 69*; Kalkpfannen des östlichen Damara-landes. Dr. H. Michaelsen, 154*; S. Passarge, 154*; Lüderitzland. Dr. P. Range, 716*; Notes on . . Diamonds. C. Krause, 637*; Origin of German South-West African Diamonds. P. A. Wagner, 69*; Südwestafrikanische Diamantensorgen, 154*; Reisestudien aus. Prof. Dr. E. Moritz, 791*; Tirashochfläche. Dr. Moritz, 396*; Verbindungsweg zwischen Deutsch-Südwestafrika und der Betschuanenland Eisenbahn. F. Seiner, 154*; Wollschafzucht in Deutsch-Südwestafrika. Dr. E. Breitung, 556* ¶Maps of German Southwest Africa: Deutsch-Südwestafrika. P. Sprigade and M. Moisel, *n.*, 231; Farm-Übersichtskarte von dem Bezirk Gibeon und dem Distrikt Maltahöhe, *n.*, 956; Karte der Tizas Hochfläche, *n.*, 159; Skizze des Weges Otjivarongo-Waterberg, 548*

German West Africa: ¶See Kamerun und Togo.

Portuguese West Africa, Map: ¶Portugiesische Grenzgebiet gegen Deutsch-Südwestafrika zum Verfolg

der militärischen Operationen im Distrikt Huilla, 547*

Agadir, Maps of: ¶Agadir und Umgebung, 797*; Le Port d' —, 797*; Tiefenverhältnisse der Bucht von, 797*

Agassiz, Alexander: His Life and Scientific Work. Sir John Murray, 794*

Agassiz Lake, Glacial. Map of the — showing preglacial Drainage in the Basin of Lower Great Lakes, 954*

Agricultural Labor: Enquête Intern. sur la main-d'œuvre agricole dans les colonies et les pays tropicaux, 559*

Agricultural Staples, Causes of Increased Cost of. E. D. Jones, 399* Air. See Atmosphere.

Aitken, Dr. J. Did the Tail of Halley's Comet affect the Earth's Atmosphere?, 228*

Aitoff, D. Colonisation russe en Asie, 637*; Projet de transcription des noms géographiques de l'empire russe sur la future carte intern. du monde au millionième, 478*

Alabama: Geological Survey of, 521; Results of Spirit Levelling . . 1896 to 1909. R. B. Marshall, 313*; Southern Part of Cahaba Coal Field. C. Butts, 867* ¶Maps of Alabama: Columbiana Quad., 873*; Map to show production of cotton in 1909, 229*; Map and Sections of S. Part of Cahaba Coal Field. C. Butts, 629*; Montevallo Quadrangle, 75*; Sketch map showing location of iron-ore and marble Deposits S. E. of Calera, 874*; Soil Survey Map of Tallapoosa Co., 229*

Alaska: ¶Conditions of Wild Life in. M. Grant, 714*; Alaska Earthquakes of 1899. L. Martin, 151*; Geographical Influences in — L. Martin, 313*; Cruise of Revenue-Steamer Corwin in Alaska and the N. W. Arctic Ocean in 1881. I. C. Rosse, J. Muir et al, 720*; Geology of Berners Bay Region. A. Knopf, 635*; Geol. Reconnaissance in S. E. Seward Peninsula and Norton Bay-Nulato Region. P. S. Smith and H. M. Eakin, 867*; Lecture on. Hon. J. G. Brady, 365; Results of Prel. Study of the so-called Kenai Flora of. A. Hollick, 553*; Telegraph and Cable Systems of — and the Philippines and Operations in the U. S., 948*; Water-Power Reconnaissance in S. E. — J. C. Hoyt, 474*; National Geographic Soc. Researches in. L. Martin, 948*; ¶Glaciers: Glacial Advance in Alaska

- and Earthquakes, Prof. R. S. Tarr, 285; Glacial Studies in, 448; Glaciers of Prince William Sound and Southern Part of Kenai Peninsula. U. S. Grant and D. F. Higgins, 321, 401, 721. ¶Harriman Alaska Series (Smithsonian Institution): Geology, B. K. Emerson, C. Palache, *et al*, 480*; History, Geography, Resources. Wm. H. Dall, C. Keeler, *et al*, 480*; Narrative, Glaciers, Natives. J. Burroughs, J. Muir and G. B. Grinnell, 480*; Bryozoans. A. Robertson, 480*; Crustaceans. M. J. Rathbun, H. Richardson, *et al*, 480*; Enchytraeids. G. Eisen, 480*; Hydroids. C. C. Nutting, 480*; Insects. Wm. Ashmead, N. Banks, D. W. Coquillett, *et al*, 480*; Land and Fresh Water Mollusks. Wm. H. Dall, 480*; Nemerteans. W. R. Coe, 480*; Tubicolous Annelids. K. J. Bush, 480*; ¶Minerals and Mining: Coal and its Utilization. A. H. Brooks, 474*; Geol. and Mineral Resources in Solomon and Casadepaga Quadr. P. S. Smith, 474*; Mineral Resources of Nulato-Council Region. P. S. Smith and H. M. Eakin, 151*; Mining in—1910, 133; Mining and Prospecting on Prince William Sound in 1909. U. S. Grant, 151*; in Seward Peninsula. F. F. Henshaw, 474*; in Southeastern—. A. Knopf, 474* Prel. Report on Mineral Resources of southern Part of Kenai Peninsula. U. S. Grant and D. F. Higgins, 151* ¶Maps of Alaska: Map of Part of 158*; Physical Map, *n.*, 954; Map compiled from Surveys of Alaska Road Comm., *n.*, 875; Sketch Map Showing Distribution of Forest, Glaciers and Snowfields, 390*; U. S. G. S. Maps: Distribution of Timber, 630*; Geological Maps of: Central Alaska, 795*; Berners Bay Region, 228*; Fairbanks District. L. M. Prindle and F. J. Katz, 795*; Nizina District. F. H. Moffit and S. R. Capps, 874*; Nulato-Norton Bay Region, *n.*, 630; Omilak Region, 630*; S. E. Seward Peninsula, *n.*, 630; Solomon and Casadepaga Quads, 157*; Geol. Reconnaissance Map of Mount McKinley region. A. H. Brooks and L. M. Prindle, 795*; Index Map—Showing Areas covered by Topographic Maps, *n.*, 389; Map of Copper and Chitina Valleys, 874*; Reconnaissance Maps of Mount McKinley region, 795*; S. W. Part of Kenai Peninsula, 308*; southwestern Seward Peninsula, 629*; Yukon-Tanana Region, Circle Quad., *n.*, 629; Relation of Alaska Coal Fields to Transportation Routes, 308*, *n.*, 953; Relief Map of Central, 794*; Sketch Map of Bonfield and Kantishna regions, 795*; Sketch Map showing distribution of timber in Mount McKinley Region, 795*; Topographic Maps: Berners Bay Region, 228; Nizina District, 874*; Solomon and Casadepaga Quadrangles, 157*; Yentma Mining District. R. W. Porter, 795*; U. S. Coast and Geod. Survey Charts: Alaska Peninsula and Aleutian Islands to Segum Pass, 545*; Arctic Coast of, 157*; Bristol Bay: Nushagak Bay and Approaches, 309*; Cape St. Elias to Shumagin Islands, 545*; Shelikof Strait and Afognak Island, 309*; Sketch of General Progress, 1909-10, *n.*, 470; Wrangell Strait, 875*
- Albania: Au Montenegro et en Albanie. Baron J. de Witte, 315*; Wanderung durch das östliche Bosnien, Montenegro und Albanien. L. Edlinger, 477*
- Albemarle Sound from Pasquotank R. to Roanoke and Chowan Rivers, Chart U. S. Coast and Geod. Survey, 309*
- Alberta: ¶Coal Fields of Jasper Park. D. B. Dowling, 948*; Edmonton Coal Field. D. B. Dowling, 554*; Lake Minnewanka Section. H. W. Shimer, 949*; Pre-Cambrian Rocks of Bow River Valley. C. D. Walcott, 222* ¶Maps of Alberta: Bow River Valley between Bow Peak and Castle Mountain Station, 77*; Cereal Map of, *n.*, 159; Index to Townships in Alberta, etc., 230*, *n.*, 390; Top. Sketch of Portion of Jasper Park, 796*; Sketch Maps Showing Topography of the 18th, 17th, 15th, 10th, and 9th Base Lines, 390*
- Alcock, Sir Rutherford. Art and Art Industries in Japan, 236*
- Alcoolisme dans les colonies et les pays tropicaux. Dr. Kermorgant, 479*
- Aldabra Islands, Being an account of—and Neighboring Islands not Explored by Prof. J. S. Gardiner. J. C. F. Fryer, 316*
- Aleppo. M. Holzmänn, 717* ¶Map showing Gertrude Bell's Route from Aleppo to Konia, 957*
- Alexander, Lieut. Boyd, Diary of his Explorations, 55

- Alexandria, Notes on temperature at. J. I. Craig, 636*
- Algæ, Marine, Method of Mapping the Distribution of. N. M. Johnson, 399*
- Algeria: ¶Algérie. V. Demontès, 790*; Les Beni-Messaoud. Baron de Vialar, 476*; Étude d'une zone frontitière. Confins algéro-marocains. A. Bernard, 790*; Exploitation de l'Alfa et les ressources naturelles dans l'Annexe d'El-Aricha. A. Izard, 476*; Des facteurs de l'acclimatation du bétail européen en Algérie et dans les pays chauds. Th. Monod, 314*; Les mines de plomb et de zinc. P. Lemoine, 716*; Montagnes d'Algérie. Mouzaïa, Aurès, Djurdjura. Gen. Bernard, 69*; L'œuvre française dans les Confins Algéro-Marocains et ses Résultats politiques. A. Bernard, 223*; Œuvre de la France en Algérie jugée par les indigènes. J. Desparmet, 869*; Tabacs en Algérie. G. Méliat, 69* ¶Maps of Algeria: État d'avancement des travaux. Tableau d'assemblage des Cartes d'Algérie et de Tunisie. Serv. Géog. de l'Armée, 547*, 707*; Frontière Orano-Marocaine septentrionale, 708*; Mines de Zinc, de Plomb et de Cuivre, 547*; Zones pacifiées de 1903 à 1910, 707*
- Algonquin and Nipissing, Instrumental Survey of Shorelines of Extinct Lakes of. J. W. Goldthwait, 949*
- Ali Khan, Syed Sirdar. Lord Curzon's Administration of India, *rev.*, 783
- Allan, J. A. Ice River District, B.C., 948*
- Allard, Hon. J. Richesse forestière de la province de Québec, 554*
- Allidridge, T. J. Sierra Leone and Its Commercial Expansion, 717*
- Allegheny Region, Southerly Extension of Onondaga Sea in. E. M. Kindle, 714*
- Allen, G. M. Irrigated Lands of the State of Washington, 714*
- Almagia, Prof. R. Val di Comino o Cominese, 639*
- Almanach de Gotha. Annuaire général, diplom., et stat., 1911, 320*
- Almanack for the Year of Our Lord, 1911. J. Whitaker, 320*
- Alps: ¶Les Alpes et les grandes ascensions. E. Levasseur, 238*; Im Ballon über die Jungfrau nach Italien. G. A. Guyer, *n.*, 946; Beiträge zur geologischen und topographischen Kenntniss der östlichen Alpen. A. V. Klipstein, 238*; Érosion glaciaire et la formation des vallées alpines. E. de Martonne, 558*; Features of Alpine Scenery due to Glacial Protection. Prof. E. J. Garwood, 315*; Grenzgebiet der nördlichen Kalkalpen. O. Maull, 397*; High-Roads of the. C. L. Freeston, *rev.*, 381, 934; Holidays on High Lands; or Rambles. . . Search Alpine Plants. H. Macmillan, 238*; Jahrbuch des Schweizer Alpenclub, 1900-11, 880*; Journals of Excursions in the Alps: the Pennine, Graian, Cottian, etc. W. Brockedon, 238*; Klubhütten-Album des Schweizer Alpen-Club, 880*; Limite septentrionale de l'olivier dans les Alpes françaises. R. Blanchard, 558*; Lötschberg Tunnel, 528, 689; Neue Studien aus den Alpen. H. Noë, 238*; Aus den nördlichen Kalkalpen. H. v. Barth, 239*; Nouvelle Description des Glacières, . . . qui forment la Grande Chaîne des Alpes de Savoie, de Suisse et d'Italie. (Marc-Théodore) Bourrit, 238*; Nouvelle Description des Vallées de Glace . . . des Alpes, etc. (Marc-Théodore) Bourrit, 237*; Schneegrenze in dem französischen Alpen. Dr. V. Paschinger, 793*; Studien über Gebirgspässe mit besonderer Berücksichtigung der Ostalpen. Dr. J. Sölch, 602; Stryan, Carnac and Julian Alps. J. Ball, 237*; Variations périodiques des glaciers. 1909. Alpes françaises, etc., C. Rabot, 558*; Alpes orientales. Prof. Dr. E. Brückner, 477* ¶Maps of the Alps: Hand und Reise-Karte der Alpen Länder. V. v. Haardt, 234*; Hölzel's Wandkarte der Alpen auf Grundlage der V. v. Haardschen Karte. Dr. F. Heiderich, *n.*, 79; Maps illustrating "Les Cirques de Montagne" (Alpes fribourgeoises, etc.), 959*; Sketch Map of Four Great "Rockgroups" of. After Prof. Steinmann, 798*; Übersichtskärtchen der nordsteirischen Alpen im Gebiete der Mürz, Mur und Liesing, 878*; Waldgrenzkarte der österreichischen Alpen. Dr. R. Marek, *n.*, 710
- Alsberg, M. Südpolar-Land in seinen Beziehungen zur Verbreitung der Pflanzen und Tiere, 952*
- Altai: Altaiskii Meteorit 1904 goda [Altai Meteorite.] V. N. Mamontov, 74*
- Altamaha River Drainage Basin, 394*
- Altitude Determination: Periodischen Fehler barometrisch bestimmter Hö-

- henunterschiede in inneren Tropenzone. Dr. Hugershoff, 73*
- Alves Dos Santos, A. Navegação na costa do Rio Grande do Sul, 715*
- Amazon Basin: Ancienne Capitaines de l'Amazonie. E. Eude, 476*; Dr. Koch-Grünberg returns to the, 525; Rubber Workers of the. A. Lange, 33
- Amazon River. I. Bowman, 555*; Source of the. Dr. W. Sievers, 197
- Amboyina: Ambonsche Historie. G. E. Rumphius, 224* ¶ Map of Island — and the Moluccas, 472*
- Ambrohn, Dr. L. Bericht über die astron. geodät. Ergebnisse der deutsch-französischen Expedition zur Aufnahme des Ostkamerun-Grenzgebietes, 223*; Bericht über die astronom. Ortsbestimmungen . . . Hauptmann Foerster und Oberleut. Schwartz . . . Süden Kameruns ausgeführt haben, 223*
- Ameghino, Dr. Don Florentino, *Obituary*, 921
- America: ¶ Carácter de la Conquista Española en América y en México, según los textos de los Historiadores Primitivos. G. García, 480*; Coconuts in the Americas. C. M. Brown, 313*; History of Coconut Palm in. O. F. Cook, 394*; Economic Importance of the Plateaus in Tropic America. Prof. J. R. Smith, 36; Geol. Work of Ants in Tropical. J. C. Branner, 394*; History of North and South America. From Its Discovery to the Death of Gen. Washington. R. Snowden, 236*; List of Publications, Bureau American Ethnology, 151*; Mémoires philosophiques, historiques, physiques concernant la découverte de l'Amérique. Don Antonio de Ulloa (1787), 319*; Some Problems of The American Race. W. H. Holmes, 151*; Quelques mots sur la science américaniste au début du XX^e siècle [Amer. Anthropology]. Baron de Borchgrave, 474*; Sponge Industry of the Americas. F. A. Pierce, 553*; Tin Mining in the Americas, 313*; Pan American Railway, 313*; Unternehmen der panamerikanischen Bahn. R. Hennig, 313* ¶ Map: Verbreitung von Steinschleuder und Blasrohr in Amerika, 309*
- Central America: ¶ Studies of Mexican and Central American Plants. J. N. Rose, 636* ¶ Maps of Central America: État actuel des voies ferrées dans l'Amérique Centrale, 634*; Linguistic Map of Mexico and Central America (Bur. of Ethnology). C. Thomas and J. R. Swanton, 706*
- North America: ¶ Abrupt Appearance of Cambrian Fauna on North American Continent. C.D. Walcott, 151*; Bibliography of N. A. Geology for 1909, with Subject Index. J. M. Nickles, 66*; Check-List of N. A. Birds prepared by Committee, Amer. Ornithol. Union, n., 788; Geographical and Comparative List of Birds of Europe and —. Charles Lucian Bonaparte, Prince of Musignano, 320*; Comparison of N. American and European Glacial Deposits. F. Leverett, 317*; Distribution and Migration of North Amer. Shorebirds. W. W. Cooke, 66*; Sur la dernière période glaciaire en Europe et dans l'Amérique du Nord, etc. N. J. Krischtafowitsch, 317*; Nature Sketches in Temperate America. J. L. Hancock, *rev.*, 863; Supplementary Geography. J. F. and A. H. Chamberlain, n., 939; Natural Bridges, with Discussion of their Origin. H. F. Cleland, 474*; Outlines of Geologic History with Especial Reference to, *rev.*, 297; Pleistocene Glaciation of North America viewed in the Light of our Knowledge of Existing Continental Glaciers. W. H. Hobbs, 641; Reisen in den Vereinigten Staaten, Canada und Mexico. J. W. von Müller, 319*; Streifzüge durch das nordamerikanische Wirtschaftsleben. Dr. E. Schultze, *rev.*, 531; On Symmetric Arrangement in the Elements of the Paleozoic Platform of. R. Ruedemann, 221*; Synthesis of Paleogeography of. E. Suess, 635*; Travels through . . . 1825 and 1826. Bernhard, Duke of Saxe-Weimar Eisenach, 318* ¶ Maps of North America: Distribution of Muskrats as Known at Present, n., 546; Glaciated Areas in — and Europe, 959*; Goode's Base Map, n., 712; North America (Oxford Wall Maps), n., 80; Persistence of Idea of North America as a Group of Islands, 1502-1622, 799*; Map of — showing interlapping late Black River and early Trenton Invasions from the Arctic, Atlantic, Gulf of Mexico and Pacific Sides, 954*; Physical Map of, *rev.*, 799; U. S. Biol. Survey, Fourth Provisional Zone Map. C. H. Merriam, V. Bailey, and Others, 707*; Sailing Chart of Northwest Coast from San Francisco to Bering Sea, (Chart U. S. Coast and Geod. Sur.), 545*

- South America: ¶ Across South America. H. Bingham, *rev.*, 694; *Amérique latine d'aujourd'hui*. H. Lorin, 222*; *Estudio geológico de nuestro continente*. A. A. Romero, 950*; *Great States of —*. Condition and Resources, etc. C. W. Domville-Fife, *rev.*, 459; *Mesure d'un Arc de Méridien Équatorial en Amérique du Sud*. Mission du Service Géog. de l'Armée. Angles Azimutaux, 555*; *Zoologie*, 636*; 868*; *Zur Völkerkunde Südamerikas*. O. von Buckwald, 475* ¶ Maps of South America: Eduard Graf v. Wickenburgs Reisen in Südamerika, 1907-10, *n.*, 78; Goode's Base Map, *n.*, 712
- American Antiquarian Society. Handbook of Information, 789*
- American Bison Society, Reports of, 222*
- American Geographical Society: ¶ Annual Meeting, 130; Annual Report, 131; Award of Society's Medals, 51, 283; Educational Exhibition, 518; Honorary and Corresponding Members and Fellows of —, 1911, 605; New Home of the, 481; Transactions, 51, 130, 195, 283, 365; Transcontinental Excursion of 1912, 775
- American Geographers. See Association of.
- Américanistes, Le XV^e Congrès International des. Dr. Capitan, 228*
- Amerind. See Indian, American.
- Amery, L. S. Attempt on Mount Robson, 222*
- Amundsen, Capt. R., Base of Operations in the Antarctic, 690; Dr. Nansen explains —'s Advent in the Antarctic, 451
- Amur Region, On Perpetual Congelation and Forms of Ice in. [In Russian.] B. Polynoff, 224*; Russian Scientific Expedition to, 289
- Amur, Steamship Service on — and Shilka Rivers, 621
- Anatolia. See Asia Minor.
- Andalusian Cordillera. [In Russian.] B. Dobrynin, 316*
- Andersen, H. C. Rambles . . . Hartz Mountains, Saxon, Switzerland, etc., 400*
- Anderson, R. Geology and Oil Prospects of Reno Region, Nev., 474*; Preliminary Report on Geology and Oil Prospects of Cantua-Panoche Region, Cal., 394*; Two Areas of Oil Prospecting in Lyon Co., W. Nevada, 313*
- Anderson, R. M., Stefánsson and — in the Canadian Arctic, 771; More News from, 920
- Anderson, T. Ascent of Matavanu in Savaii, 225*
- Andes: ¶ Patagonischen Anden zwischen 42. u. 44. Grade s. Breite. Dr. P. Krüger, 949*; Prof. F. Kühn in the, 524; Eine Reise über die Anden. Dr. A. N. Schuster, 868*; Beiträge zur Kenntnis der Argentinischen Cordillere. F. Kühn, 555*; *rev.*, 847; Vorkordillere zwischen Mendoza u. Jachal F. in Argentinien. Dr. R. Stappenbeck, 950*; Vorläufiger Bericht über die Resultate der Juncal-Expedition in den Anden. Dr. F. Reichert, 868*
- Andonara en Lomlem, Beschrijving der Eilanden — behorende tot de Solor-Groep. J. D. H. Beckering, 638*
- Andrew, A. R. P. et T. E. G. Bailey. Carte géol. du Nyassaland, 708*
- Andrews, C. C. Prevention of Forest Fires in Minnesota, 474*
- Andrews, E. C. Excursion to the Yosemite, or Studies in the Formation of Alpine Cirques, "Steps" and Valley "Treads," 553*; Geographical Unity of Eastern Australia in Late and Post Tertiary Time, with Applications to Biological Problems, 718*
- Andrews, R. C. Shore Whaling: A World Industry, 872*
- Angola, Map of: Portugiesische Grenzgebiet gegen Deutsch-Südwestafrika zum Verfolg der militär. Operationen im Distrikt Huilla, 547*
- Anhalt, Provinz-Sachsen und Mark Brandenburg, Verbreitung der Salzflora in. (Map), 958*
- Animals, Domestic: Distribution géographique des races antiques parmi les animaux domestiques. Dr. C. Keller, 74*
- Anir Inseln. (Feni-Inseln, Wöneram Insel), Map. Dr. K. Sapper, *n.*, 232
- Ankogel und Hochalmspitze, Talstudien im Gebiete des —. Prof. Dr. E. Stummer, 477*, Map, 233*
- Annals of the Association of American Geographers, 365
- Annam, Life in. Madame G. M. Vassal, 717*
- Annaratone, C. A. In Abissinia, 869*
- Anna See, Szent, (St.), Isohypsenkarte der Umgebung des, 957*
- Annoni, A. M. Tre giorni a Malta, 398*
- Anstey, T. C. Crime and Government at Hong Kong, 236*

- Antarctic. See also Polar: ¶ Descriptive: Antarctic Land of Victoria. From Voyage of "Discovery." M. Zimmermann, 478*; Hudson Land. E. S. Balch, 445; Ice Masses on and about the Antarctic Continent. W. H. Hobbs, 398*; Schelfeis der Antarktis am Gaussberg. E. V. Drygalski, 478*; Südpolar-Land in seinen Beziehungen zur Verbreitung der Pflanzen und Tiere. M. Alsberg, 952* ¶ Expeditions: Antarctic Agreement, 57; Antarctic Expeditions, 690; Australasian — Expedition. Dr. D. Mawson, 72*; Australian — Expedition to Explore Wilkes Land, 138; Deutsche Antarktische Expedition, 794*; — W. Filchner, 228*; Weitere Mitteilungen über die geplante —. W. Brennecke, 227*; Capt. R. F. Scott sails for the Antarctic, 57; Japanese Expedition, 291, 529; Dr. Mawson's Expedition, 921; Contributions to the —, 860; Expédition antarctique française 1908-10. Dr. J. B. Charcot, 559*; Le Pourquoi Pas? dans l'Antarctique, 1908-10. Dr. J. B. Charcot, 719*; Second French Antarctic Expedition. Dr. J. B. Charcot, 639*; Voyage of the "Why Not," 1908-10. Dr. J. Charcot, English version by P. Walsh, *rev.*, 865; Dr. Nansen explains Amundsen's Advent in the, 451; Amundsen's Base of Operations, 690; Fram Returns to Buenos Aires, 528; Sir Ernest Shackleton and Wilkes Land, 58 ¶ Explorations and Scientific Results of: Die Asciden der Deutschen Südpolar-Expedition, 1901-3. Zoologie. Dr. R. Hartmeyer, 800*; British Antarctic Expedition, 1907-09. Reports scientific investigations. Vol. 1. Biology. J. Murray, Editor, *rev.*, 145, Scientific Work of — 1907-9. J. Murray, 72*; Tidal Observations of the —, 1907. Sir George Darwin, 398*; Charcot's Antarctic Explorations. E. S. Balch, 81; Expédition du Dr. Charcot. Principaux Resultats d'océanographie physique. J. Rouch, 872*; Relaciones preliminares de los Trabajos ejecutados en la Antartica por la misión á órdenes del Dr. Charcot 1908-10, 710*; Dr. Mawson's Plans of Exploration, 370; Ozeanographische Arbeiten der Deutschen Antarktischen Exped. Dr. W. Brennecke, 952*; Shackleton's Südpolarexpedition und ihre Ergebnisse. O. Baschin, 227* ¶ Meteorology: Antarctic Geology and Polar Climates. W. M. Davis, 478*; Interdiurnal Variability of Temperature in Antarctic and Sub-Antarctic Regions. R. C. Mossman, 58; Meteorology in Weddell Quadrant during 1909. R. C. Mossman, 72*; National Antarctic Expedition, 1901-4. Meteorology, Part 1. Observations at Winter Quarters, etc., *rev.*, 146; The Present Position of — Meteorology. R. C. Mossman, 228* ¶ Maps of the Antarctic: Carte provisoire de l'Antarctique sud-américaine. M. Bongrain, facing p. 81; South Polar Regions. With Antarctic Continent drawn to illustrate the probable topography from present available data. Dr. D. Mawson, *n.*, 712; Sketch Map of Northern Peninsula of West Antarctica, 879*; Supposed Antarctic Continent, Dr. D. Mawson, *n.*, 712; Three Maps of adjoining parts of the Ross and Weddell Quadrants, *n.*, 712; West Antarctica. Maps . . . French Antarctic Exp. 1908-10, *n.*, 393
- Anthon, C. Classical Dictionary . . . of the Greeks and Romans with account of coins, weights and measures, etc., 320*
- Anthropogeography. See under Geography.
- Anthropology: ¶ Anthropology. W. Crooke, 72*; History of —. A. C. Haddon, and A. H. Quiggin, *rev.*, 543; Kunst und Völkerentwicklung . . . Früh und vorgeschichtliche Kultur, usw. Dr. G. Wilke, *n.*, 216; Linguistische Probleme in ethnol., anthrop. und geogr. Beleuchtung. Dr. A. Dirr, 318*; Mitteilungen der Anthropol. Gesellschaft in Wien, 316*; Morals of Uncivilized People. A. L. Kroeber, 399*; Notes on Anthropological Problems and Their Social Applications, 479*; Quelques mots sur la science américaniste au début du XX^e siècle. [Amer. Anthropol.], Baron de Borchgrave, 474*; Recent Discoveries Bearing upon Antiquity of Man in Europe. G. G. MacCurdy, 477*; Recherches anthropologiques sur la Basse-Californie. Dr. P. Rivet, 635*; Stellung der Pygmäenvölker in der Entwicklungsgeschichte des Menschen. P. W. Schmidt, 479*; Die Wurzeln der Kapholländischen Volksüberlieferungen. F. T. Schönten, 72*
- Antilles, Lesser: Colonization of the Caribbean. F. Cundall, 395*
- Ants, Geologic Work of. Prof. J. C. Branner, 293
- Anufrief, I. Winds and Ice in the

- White Sea and Novaya Ziemla in 1910, 559*; Winter in Novaya Ziemla in 1909-10, [In Russian], 639*
- Apalachicola R. Drainage Basin, 394*
- Apennines: ¶ Appennino settentrionale e centrale. F. Sacco, 793*; Studien in den Kalkmassiven des. Dr. A. Rühl, 639* ¶ Map of Apennines: Schizzo geotettonico dello Appennino settentrionale e centrale secondo i rilevamenti geol. di F. Sacco, 311*
- Appalachian Mountain Club, Register of — for 1911, 789*
- Appalachian Region: ¶ Comparison of Trans-Appalachian Railroads. A. E. Perkins, 314*; Denudation and Erosion in southern — and Monongahela Basin. L. C. Glenn, 553*, 635*; — Forests, 789*; ¶ Maps of Appalachians: Drainage Basins of Southern, 229*; Map showing troughs and principal lines along which stratigraphic overlaps are common, 954*; Map of Southern — Valley showing Outcrops of Ordovician Rocks, 954*
- Appellöf, Dr. A. Untersuchungen ueber den Hummer, 317*
- Arabia: ¶ Geographische Bedeutung der Araber. E. Banse, 155*; Geology of Aden Hinterland. Capt. R. E. Lloyd, 70*; Dr. Musil's Explorations in, 137 ¶ Map of Arabia: Map of N. E. — showing routes of Capt. G. E. Leachman, 1910, and other explorers, 392*
- Aragon: Barrancos et Cuevas. L. Briet, 719*
- Aral-See, Der. S. Sowelow, 155*
- Aramaic Inscriptions, Glossary of the. S. A. Cook, 320*
- Ararat: Poiezka na Ararat [A trip to]. J. Leclercq, 70*
- Arber, E. H. N. Natural History of Coal, *n.*, 937
- Arbuckle Mts., Okla., Report on Geological and Mineral Resources of. C. A. Reeds, 880*
- Archæology: ¶ Archæology of Delaware Valley. E. Volk, 800*; Conférence du P. Scheil de l'Institut sur les fouilles et l'histoire de la Babylonie, de l'Assyrie et de l'Elam, 791*; Cyzicus. Account of History and Antiquities . . . Adjacent District, etc. F. W. Hasluck, *n.*, 930; Egypt Exploration Fund. General Index to Archæological Reports, Vols. I-XVIII, W. L. Nash, Compiler, 960*; Entdeckung des bei Homer erwähnten Räucheraltarpfatzes der Aphrodite in Paphos auf Cypern. Dr. M. Ohnefalsch-Richter, 317*; Explorations in the Department of Peten, Guatemala. Tikal. Report of Explorations. T. Maler, 949*, Preliminary Study of Prehistoric Ruins of. A. M. Tozzer, 949*; H. I. Smith to Conduct Archaeological Survey of Canada, 861; Karanög. The Romano-Nubian Cemetery. C. L. Woolley and D. Randall-MacIver, *n.*, 388; La Scava; or, Some Account of Excavation of a Roman Town on the Hill of Châtelet, etc. [Stephen Weston], 239*
- Arcin, A. Chemin de fer de la Guinée française, 716*
- Arctic. See also Polar: ¶ Descriptive: Das arktische Gebiet als Entwicklungszentrum. Th. Arldt, 227*; Arctic Tides. Dr. R. A. Harris, 202; Grinnell Land. Remarks on English Maps of Arctic Discoveries, 1850-51, etc. P. Force, 400*; Ice in Arctic Seas in 1910, 200; Oceanography of the Sea of Greenland. D. Damas, 479*; The Toll of the Arctic Seas. D. M. Edwards, *n.*, 786 ¶ Expeditions: Capt. Bernier's Return from, 920; Expedition to Crocker Land, 691; — to Jan Mayen, 451; Jan Mayen Expedition of 1911. W. S. C. Russell, 881; Kaptajn Einar Mikkelsen's Ekspedition. Lieut. W. Laub, 228*; Leffingwell on the Arctic Coast, 528; Peary Arctic Club Expedition to the North Pole, 1908-9. R. E. Peary, 72*; Project of a Spanish Polar Expedition, 859; Zeppelin-Studienfahrt nach Spitzbergen und ins nördliche Eismeer, 1910. Dr. E. v. Drygalski, 398* ¶ Explorations and Scientific Results of: Disappearance of Ancient Icelandic Colony of Greenland, 920; Expédition danoise de Mylius Erichsen à la côte nord-est du Groenland. Lieut. Trolle, 559*; History and Field Work of Peary Arctic Club. H. L. Bridgman, 872*; Hydrographische Beobachtungen der schwedischen Expedition nach Spitzbergen. A. C. Reichard, 872*; Notes on Early American Arctic Expedition. H. G. Bryant, 872*; Polar Regions showing Routes and Explorations of R. E. Peary, from 1892-1906, 712*; Rapport sur l'expédition polaire néerlandaise qui a hiverné dans la mer de Kara en 1882-83. M. Snellen et H. Exama, *rev.*, 146; Scottish Exploration in Prince Charles Foreland 1906-7. W. S. Bruce, 872*; Stefánsson and Anderson in the Canadian Arctic, 771 ¶ Maps of the Arctic: Carte indiquant la position de l'Isthme uni-

- sant P'île Clavering au Continent, 712*; Cotidal Lines for Arctic Regions. Polar Projection. R. A. Harris, 312*; Die wichtigsten Nordpolarreisen des XIX u. XX Jahrhunderts . . . besonderer Berücksichtigung . . . Erreichung des Pols war. P. Sprigade u. M. Moisel, *n.*, 234
- Arctic Ocean, Cruise of Revenue Steamer Corwin in Alaska and the N. W. — in 1881. I. C. Rosse, J. Muir et al., 720*
- Argand, E. Une Vallée tectonique. Doire Baltée en aval d'Aoste, 478*
- Argentina: ¶ Argentina and her People of To-day. N. O. Winter, *rev.*, 625; — Studied from Physical Point of View. F. Latzina, 395*; Artesian Water Possibilities in, 135; Beiträge zur Kenntnis der Argent. Cordillere. F. Kühn, 555*; *rev.*, 847; Beiträge zur Kenntnis des Quebrachogebietes in — und Paraguay. Dr. R. Lütgens, 715*; Carte de la région des marais du Rio Pilcomayo et du Rio Confuso. A. Schmied et Arnold, 67*; Climate of. W. G. Davis, 314*, *rev.*, 533; Exploración y estudio de la laguna Iberá, 950*; Frontera Argentino Brasileña, 868*; Información descriptiva sobre la provincia de San Juan. J. Campbell, 715*; Penitentesschneefelder Gebiet zwischen Aconagua und Tupungato. Dr. F. Reichert, 475*; República —. E. G. A. de Correa-Morales, 868*; Ricordo Commemoraz. Centenaria della Indipendenza della Repubblica, 67*; Unterricht der Geographie in Argentinien und seine Ausdehnung. E. G. A. de Correa Morales, 868*; ¶ Economic and Commercial: Agricultural and Pastoral Census of Stock Breeding and Agriculture in 1908, 314*; Agrolgy of. P. Lavenir, 395*; Cultivation of Plants for Industrial Purposes. C. D. Girola, 314*; Cultivation of Trees in. F. Maudt, 314*; Dairy Industry. Dr. E. Fynn, Jr., 314*; Estancias in. G. Daireaux, 314*; Evolution of Live Stock Breeding in. H. Gibson, 314*; Industria Lechera en la República Argentina, 640*; Milling Industry. E. Lahitte, 314*; Meat Industry of. R. Pillado, 314*; Notes . . . Agricultural and Pastoral Flora of. C. Spezzolini, 314*; Tierras fiscales de la colonia Caroya. G. Vitoria, 868*; Trade, Past and Present. F. Latzina, 314*; Wine Growing Industry in. R. Palencia, 314* ¶ Maps of Argentina: Croquis-Itinerario desde Rosario de Lerma hasta Cachi. F. Kühn, 471*; Demarcación de Límites con Chile. Region de la Puna. Z. Sánchez and T. Loos, 955*; Distribution of hydro-metric stations, 1909, 231*; Distribution of meteor. stations, 1909, 231*; General Map of, *n.*, 231; Hypsometric map, *n.*, 231; Map of Railways in 1909, 231*; Vorkordillere zwischen den Flüssen Mendoza und Jachal. Dr. R. Stappenbeck, 707* (Argyll), [The Duke of]. The Glacial Theory, 239*
- Arisaig-Antigonish District, Nova Scotia. M. Y. Williams, 949*
- Arizona: ¶ Black Mesa Coal Field. M. R. Campbell and H. E. Gregory, 867*; Caves and Ruins of — and Colorado. C. Hallock, 394*; Coal Deposits near Pinedale, Navajo Co. A. C. Veatch, 867*; History of the Grand Canyon District. Prof. D. W. Johnson, 285; Meteor Crater in northern Central. D. M. Barringer, 788*; Prel. Report on a Visit to the Navaho National Monument. J. W. Fewkes, 788*; Reconnaissance of the Ore Deposits in Northern Yuma Co. H. Bancroft, 947*; Single Cycle Development of the Grand Canyon of the Colorado. H. H. Robinson, 948*
- ¶ Maps of Arizona: Bisbee Quad., 75*; Geol. Map of Part of N. W. New Mexico and N. Arizona. N. H. Darton, 157*; Map of Black Mesa Coal Field. M. R. Campbell, 630*; Parker Quad., 629*; Pinedale Coal Field, Navajo Co. A. C. Veatch, 630*; Ray Quad., 75*; Sketch Map of Navaho National Monument. W. B. Douglass, 632*; Territory of Arizona, *n.*, 795
- Arkansas: ¶ Recently Discovered Hot Springs in. A. H. Purdue, 867*
- ¶ Maps of Arkansas: Production of cotton in 1909, 229*; Slate Area of, 229*
- Arldt, Th. Das arktische Gebiet als Entwicklungszentrum, 227*
- Armagnac et les pays du Gers. G. Laurent, 718*
- Arnold, *joint author*, see A. Schmied.
- Arou et Kei, Iles. [New Guinea.] Dr. J. Roux, 156*
- Arrhenius, Dr. Svante, Personal, 294
- Arthauer, O., and Lieut. Kraft's Expedition to Sahara, 55
- Art: Kunst und Völkerentwicklung. 1 Heft. Spiral-Mäander-Keramik und Gefäßmalerei Hellenen und Thraker. Früh und vorgeschichtliche Kultur, usw. Dr. G. Wilke, *n.*, 216

- Aryans: Die Indogermanen. Dr. O. Schrader, *rev.*, 943
- Ashanti, Gold Coast and — Mapping the. Maj. F. G. Guggisberg, 791*; Sketch Map of, *n.*, 78
- Ashley, G. H. Stratigraphy and Coal Beds of Indiana Coal Field, 221*
- Ashmead, P. H. Madeira-Mamoré Railway, 636*
- Ashmead, Wm., N. Banks, D. W. Coquillett, *et al.*, Insects (Harriman Alaska Series), 480*
- Asia: ☞ Beziehungen zwischen tektonischen und seismischen Verhältnissen Ostasiens. Dr. E. Rudolph, 70*; Eastern Asia. A History. I. C. Hannah, *rev.*, 943; Empires and Emperors of Russia, China, Korea and Japan. Count Vay de Vaya and Luskod, 319*; Fortschritte der geographischen Forschungen im Asien im Jahre 1910. Dr. F. Machacek, 717*; Mantle of the East. E. Candler, *n.*, 65; Südost-Asien bei Ptolemäus. W. Volz, 315*; The West in the East from an American Point of View. P. Collier, *rev.*, 932 ☞ Maps of Asia: Goode's Base Map, *n.*, 712; Meteorological Maps, 879*; Der Orient. E. Banse, *n.*, 78; Physical Wall Map. M. Kuhnert and Dr. G. Leipoldt, *n.*, 235
- Central Asia: ☞ Asia Centrale. Note di viaggio . . . giapponese. N. Tocugirō. Traduzione di L. Nocentini, *rev.*, 304; — and Tibet. S. Hedin, 237*; Évolution du Relief de l'Asie Centrale. E. de Martonne, 557*; Flüchtige Reiseeindrücke aus dem Innern und von den Rändern Asiens. Prof. Dr. E. v. Romer, 637*; Irrigation dans l'Asie Centrale et la migration des peuples. Dr. J. de Cholnoky, 870*; Trois ans de mission dans la Haute-Asie. P. Pelliot, 557*
- Asia Minor: ☞ Fringe of Verdure Around Asia Minor. E. Huntington, 70*; Sur les grandes routes de l'Asie Mineure. J. de Nettancourt-Vaubecourt, *n.*, 65; Karst Country of Southern Asia Minor. E. Huntington, 91; Kartographie des nordwestlichen Kleinasien. Oberst v. Diest, 870*; Meine Expedition durch Vorder-Asien (Klein-Asien, usw.). Dr. H. Grothe, 870*; Noticia de una exploración geográfica y arqueológica en el Norte del Asia Menor. D. J. A. Weissberger, 224*; Reisen und Forschungen im westlichen Kleinasien. Das westliche Mysien und die pergamenische Landschaft. Dr. A. Philippsón, 951* ☞ Maps of Asia Minor: Geol. Karte des westlichen Kleinasien. A. Philippson, 708*; Topographische Karte des westlichen Kleinasien nach Aufnahmen auf Reisen die mit Mitteln des Kais. Deutschen Archäol. Instituts . . . ausgeführt sind. Dr. A. Philippson, *n.*, 548
- Russia in Asia: ☞ Baumwollernte 1910 in Mittelasien, 717*; Colonisation russe en Asie. D. Aitoff, 637*
- Turkey in Asia: ☞ Conférence du P. Scheil de l'Institut sur les fouilles et l'histoire de la Babylonie, de l'Assyrie et de l'Elam, 791*; Geographische Charakterbilder aus der asiatischen Türkei und dem südlichen mesopot. — iranischen Randgebirge (Puscht-i-küh). Dr. H. Grothe, *n.*, 65; Au pays du chemin de fer de Bagdad. H. Viollet, 951* ☞ Maps of Turkey in Asia: Eastern Turkey, Syria and Western Persia, *n.*, 160; Map showing . . . Gertrude Bell's Route from Aleppo to Konia, 957*; Kartenskizze der antiken Ruinenorte in der Umgebung von Bálalbek, 798*; Zweite Reise in der Asiatischen Türkei 1899 von Dr. M. Fr. v. Oppenheim. Bálalbek nach Haleb, 798*
- Asmara. M. Checchi, 223*
- Assam: ☞ Some coal-fields in north-eastern —. H. H. Hayden, 477*; The Naga Tribes of Manipur. T. C. Hodson, *rev.*, 698 ☞ Map of Assam: Geol. Sketch Map showing distribution of coal fields of the Naga Hills, 232*
- Assam-Tibet Borderland, murder of N. Williamson in, 686
- Asselin, H. Cité chinoise de Tchen-tou, ville principale du Se-Tchouen, 792*
- Assereto, Prof. G. Commercio e l'industria dei prodotti forestali in Italia, 227*
- Association of American Geographers, *Annals* of the, 365; Seventh Annual Meeting, 196
- Assyria: Conférence du P. Scheil de l'Institut sur les fouilles et l'histoire de la Babylonie, de l'Assyrie et de l'Elam, 791*; Map, 549*
- Astrographical: Theorie der astrographischen Ortsbestimmung. L. de Ball, 72*
- Athabaska and Saskatchewan Rivers, At the Sources of. Lecture by Mrs. C. Schaeffer, 195
- Athens: Latitude et longitude d'Athènes. D. Eginitis, 73*
- Atlantic Coast: ☞ Study of Shoreline Changes Along the, 447; Subsidence

of. T. I. Casey, 953* ¶ Chart of the Atlantic Coast from Cape Henry to Cape Lookout, 309*

Atlantic Deeper Waterways Association, Report of Proceedings, 1909, 635*; Summary of Papers on Subject with Statistics of Coastwise Commerce, 635*

Atlantic Ocean: ¶ Bedeutung einer internationalen Erforschung des in physikalischer und biologischer Hinsicht. Dr. G. Schott, 74*; Commission Intern. pour l'exploration scientifique de. Prof. A. Berget, 73*; Luftdruckverteilung über Atlantischen Ozean und Bedeutung der drahtlosen Telegraphie für Erweiterung der täglichen Wetterkarten. Dr. Polis, 74*; "Michael Sars" North Atlantic Deep-Sea Expedition, 1910. J. Hjort, 720*; Passatwinde des Atlantischen Ozeans. Dr. Mey, 640*; Seismische Verhalten des — und Pazifischen Ozeans. Dr. G. Gerland, 73*; Températures de l' — Nord (Surface et Profondeurs). A. Hautreux, 640*; Wodurch ist die hohe Wärme Europas und des Nordatlantischen Ozeans bedingt. W. Köppen, 638* ¶ Maps and Charts of the Atlantic Ocean: Campagne scientifique de la Princesse Alice, 234*; Courbes de température dans l' — Nord pendant 29 juillet-9 août, 1910; Courbes de température moyenne pendant le mois d'août, 879*; Distribution de la Température . . . à l'époque du frai des principales Gadides. M. I. N. Nielsen, 960*; *Gadus Poutassou*. Carte montrant la différence d'extension entre la zone où fraie une espèce et son aire de distribution, 960*; Verbreitung der Atlantischen Süßwasser-Aale, n., 798 ¶ U. S. Hydrographic Office Charts: Pilot Charts of the North Atlantic Ocean, 76, 158, 229, 389, 470, 545, 632*; Pilot Charts of the South Atlantic Ocean, 158, 470* ¶ U. S. Weather Bureau Charts: Meteorological Charts of the North Atlantic, 158, 229, 389, 632; Meteorological Charts of the South Atlantic, 158, 389*

Atlantic and Pacific Transport Co., 778 Atlases: ¶ Atlante geografico muto, fisico-politico, n., 393; Atlas général Vidal-Lablache, n., 312; Atlas historique ou nouvelle Introduction à l'histoire, etc. (1705), 720*; Atlas, Lernbuch und Schüller. Dr. H. Degel, 399*; Atlas of Portolan Charts. Edited by Dr. E. L. Stevenson, 530; Atlas Universel de Géographie. V. de Saint-Martin et Fr. Schrader. Mor-

golie, Maroc, Égypte et Soudan Égyptien, 312*; Indo-Chine, n., 552; Geographischer Volksschul-Atlas, usw. J. G. Rothaug, n., 713; Hammond's Pocket Atlas of the World, n., 880; Liste alphabétique des plans et vues de Villes, Citadelles et Fortresses qui se trouvent dans le grand Atlas de Mortier. Édition de Amsterdam 1696. Sir H. G. Fordham, 640*; List of Geographical Atlases in the Library of Congress, rev., 312; Literary and Historical Atlas of Europe, rev., 382; Modern Atlas to accompany Elements of Geography, Ancient and Modern (1819?). J. E. Worcester, 800*; New Edition of the Century Atlas, 692; Prof. A. L. Hickman's geographisch-statist. Taschen-Atlas von Österreich-Ungarn, n., 80; Stieler's Atlas of Modern Geography. Adapted . . . English-speaking public. B. V. Darbishire, Ninth Ed., n., 235; O 2° Visconde de Santarem e os seus Atlas Geographicos. J. A. de Freitas, n., 215

Atmosphere. ¶ Beschaffenheit der oberen Schichten unserer Atmosphäre. O. Baschin, 953*; "Centers of Action" and Seasonal Weather, 371; Drachenbeobachtungen an Bord "de Ruyter" angestellt vom A. E. Rambaldo während der Fahrt nach Ost-Indien und . . . W.-Indien, Dez.-Juli, 1909. Dr. E. van Everdingen, 720*; État de l'atmosphère marine par sondage aériens Atlantique moyen et région intertropicale. L. Teisserenc de Bort et A. L. Rotch, 560*; Fortschritte in der Erforschung der freien Atmosphäre während des letzten Dezenniums. A. Peppler, 953*; Luftbahnen am Erdboden und in der freien Atmosphäre. W. Köppen, 317*; Upper Air. E. Gold and W. A. Harwood, 479*

Atmospheric pressure: ¶ Über Abhängigkeit einiger geographischen Elemente von dem barischen Relief der Erdoberfläche. Prof. P. Brounow, 73*; On Relation between Atmospheric Pressure and Wind. J. W. Sandström, 872*; Unperiodische Temperaturschwankungen im Golfstrom und deren Beziehung zu der Luftdruckverteilung. J. Petersen, 317*; Zusammenhang zwischen Temperaturverhältnissen der Atmosphäre und dem Druck an Erdoberfläche. Prof. W. Trabert, 74* Atolls, Coral and —. Their History, Description . . . Influence of Winds,

- Tides and Ocean Currents on their Formation, etc. F. Wood-Jones, *rev.*, 944
- Aubin, E. En Haïti, Planteurs d'autrefois, Nègres d'aujourd'hui, *rev.*, 300
- Aubury, L. E. General Index to Publications of Cal. State Mining Bureau, 960*; Mineral Productions, County Maps and Mining Laws of, Cal., 960*
- Audibert, A. Cuestión de Límites entre el Paraguay y Bolivia, 720*
- Auin, Die. Ein Beitrag zur Buschmannforschung. H. Kaufmann, 154*
- Ault, J. P. Daylight Observations on Venus, 767
- Austin, Texas, Map of vicinity of, 229*
- Australasia, Map of: Goode's Base Map, *n.*, 712
- Australia: ¶Australia: The Making of a Nation. J. F. Fraser, *rev.*, 379; In the — Bush and on the Coast of Coral Sea, etc. R. Semon, 237*; An Australian Meteorite. L. L. Smith, 156*; Bananas in Tropical —, 289; Biographical Sketch of Col. W. Light, the First Surveyor of —. T. Gill, 718*; Colonisation des Régions tropicales. Exemple de l'Australie, 397*; Contributions to the Flora of. A. J. Ewart, 156*; Fisheries, 557*; Further Notes on Burial Customs. R. H. Mathews, 156*; Distribution of Land-Birds. R. Hall, 871*; Geographical Unity of Eastern — in Late and Post Tertiary Time, with Applications to Biological Problems. E. C. Andrews, 718*; Gli Italiani in. Dr. G. Capra, 871*; Meteorology of, 138, 369; Physiographic and Economic Aspects. G. Taylor, *n.*, 539; Sir Joseph Banks: The "Father of Australia." J. H. Maiden, *rev.*, 141; Year-book of — for 1911, 800* ¶Maps of Australia: Sketch Maps to illustrate paper on "Flowing Wells of Central Australia," 798*
- South Australia: ¶Allgemeine-Verhältnisse der Häfen an der Südküste von Süd-Australien, 156* Map of South Australia: ¶Geol. Sketch Map of Country along Route of Proposed Trans-Continental Railway, C. G. Gibson, *n.*, 311
- Western Australia: ¶Canning's Expeditions in, 952*; Geology and Ore Deposits of West Pilbara Goldfield. H. P. Woodward, 638*; Geological Observations in the country between Wiluna, Hall's Creek, and Tanami. H. W. B. Talbot, 477*; Irwin R. Coalfield, and adjacent districts. W. D. Campbell, 557*; Notes on an Expedition into the interior of. S. Weston, 156*; Official Guide of, *n.*, 211; Report by Surveyor-General for 1910, 397* ¶Maps of Western Australia: Geological Sketch Map of — H. P. Woodward, *n.*, 473; Geol. Sketch Maps of the Country along the Route of Proposed Trans-Continental R. R. C. G. Gibson, *n.*, 311; The Country between Arrino and Northampton. W. D. Campbell, 232*; Portions of Eastern Division traversed by the Canning Survey party, 1907-9, from Wiluna to Hall's Creek, 232*; — and West Pilbara Goldfield, H. P. Woodward, *n.*, 473; Wiluna-Kimberley Stock Route by A. W. Canning, 798*
- Austria-Hungary. See also Hungary: ¶Bergstürze des Mai 1910 in der Umgebung von Scheibbs. Dr. G. Götzinger, 71*; Bohemia and the Čechs. History, People . . . Accounts of Moravia and Silesia. W. S. Monroe, *n.*, 144; Gletscherbeobachtungen in Selrain und nördlichen Stubaï 1909. Dr. M. Lagally, 477*; Jahresbericht für 1910 [Review of geol. field laboratory work, map production, etc.] Dr. E. Tietze, 792*; Mitteilungen des k. u. k. Militärgeograph. Institutes, 558*; Oesterreichisches Seebuch, etc. H. Noë, 238*; Population (Census, 1910), 621; ¶Maps of Austria-Hungary: Carte des environs de Titel, 957*; Les environs du confluent du Danube et de la Tisza, Carte morphologique, 957*; Geographischer Volksschul-Atlas, usw. J. G. Rothaug, *n.*, 713; Geol. Map of Environs of the Spa of Stubice Toplice, 473*; Geol. Map of Vostry Fault Region, 473*; G. Freytag's Automobil- und Radfahrer-Karten, 79*; Karte der politischen Bezirke Hietzing-Umgebung, *n.*, 233; Karten zur Ergänzung der Triaskarte. Slowakien, Galizien, Bukowina, Deutschböhmen, usw. H. Hanau, 233*; Maps illustrating "Les Cirques de Montagne." Tatra. M. Koncza, 958*; Plateau des Zahnen-Kaisers, 878*; Prof. A. L. Hickman's geographisch - statist. Taschen - Atlas, *n.*, 80; Triaskarte der Habsburger Monarchie. H. Hanau, *n.*, 233; Übersichtskarte der nordsteirischen Alpen im Gebiete der Mürz, Mur und Liesing, 878*; Verkehrs-Karte von Österreich-Ungarn, *n.*, 233; Waldgrenzkarte der österreichischen Alpen. Dr. R. Marek, *n.*, 710

Aviation. See Aeronautics.

Aymard, Capitaine. Les Touareg de la région de Tombouctou, 223*

Axenfeld, K. Wie evangelische Missionare unsere Neger arbeiten lehren, 637*

Axerio, E. Brasile. Lo Stato di Goyaz, 715*

B.

Babcock, K. C. Scandinavian Element in American Population, 394*

Babylonia: ¶Conférence du P. Scheil sur les fouilles et l'histoire de la Babylonie, l'Assyrie et de l'Elam, 791*; Die künstliche Bewässerung Babyloniens. K. Ch. Christiansen, 155* ¶Map of: Carte des principales Fouilles de Babylonie, Assyrie et Elam, 549*

Bacchiani, Prof. A. Giovanni da Verazzano and His Discoveries in North America . . . according . . . Cellere Codex of Rome, English Version by E. H. Hall, 221*

Bach, Dr. H. Klima der Schweiz, 316* Backhouse, E., *joint author*, see J. O. P. Bland.

Bacot, J. À travers le Tibet oriental, 718*; Map, 550*

Baden, Statistisches Jahrbuch für das Grossherzogthum — 1910-11, 800*

Bagagem Valley, Minas Geraes, Map of, 955*

Bagdad, 224*; Aspect présent de la question du —. [Railroad]. R. de Caix, 637*; Die Bagdadbahn, 637*; Au pays du chemin de fer de. H. Viollet, 951*

Bahama Islands, Agricultural Labour and Other Conditions of. W. M. Cunningham, 554*

Bahia: ¶Geology and Topography of Serra de Jacobina. J. C. Branner, 476*; Minerals associated with Diamonds and Carbonados in the State of. J. C. Branner, 715* ¶Maps of Bahia: Map to illustrate paper on the Geography of North Eastern —. J. C. Branner, 796*; Sketch Map of Approximate Limestone Areas of the Interior of. J. C. Branner, 796*

Bahr el Ghazal (Mission Tilho), Map, n., 231

Bailey, J. F. Introduction of Economic Plants into Queensland, 225*

Bailey, T. E. G., *joint author*, see A. R. P. Andrew.

Bailey, V., *joint author*, see C. H. Merriam.

Baillie, M. First Impressions on a

Tour upon the Continent in the Summer of 1818, etc., 319*

Bakango, Les. Lieut. A. Hutereau, 314*

Baklund, O. O. Expedition of Kuznezoff Brothers to Polar Ural in 1909 [in Russian], 559*

Balch, E. S. Charcot's Antarctic Explorations, 81; Hudson Land, 445; Palmer Land, 282

Balkan Peninsula: ¶La vie politique orientale en 1909. Dr. G. Samné et Y. M. Goblet, n., 934 ¶Maps of: Carte du Lac Égéen. J. Cvijić, 710*; Église catholique dans les Balkans. R. Hausermann, n., 551; Les Lacs Égéen et Pannonien au Miocène dans la Péninsule Balkanique, n., 710

Ball, J. Styrian, Carnac, and Julian Alps, 237*

Ball, L. C. Certain Mines and Mineral Fields in North Queensland, 557*; Field Notes on Mount Flora Gold and Mineral Field, 557*; Geol. Sketch Map of Northern Part of Annan R. Tin Field, 311*; Mineral Fields in the Hinterland of Mackay: Mount Spencer, etc., 557*

Ball, Dr. L. de. Theorie der astrographischen Ortsbestimmung, 72*

Ball, M. W., and E. Stebinger. Eastern Part of Little Snake R. Coal Field, Wyo., 474*

Ball, S. H., and M. K. Shaler. Mining Conditions in the Belgian Congo, 151*

Ballooning: ¶Im Ballon über die Jungfrau nach Italien. G. A. Guyer, n., 946; Recent European Progress in Dirigible Balloons. W. A. Blonck, 318*; Registering —, Ascents, Dec. 6-11, 1909, and Aug. 8-13, 1910. W. H. Dines, 640*

Balmat, Jacques, or, The First Ascent of Mont Blanc. A True Story. T. L. Oxley, 239*

Balsam of Peru. Central American Contribution to Pharmacopeia. A. Hale, 790*

Baltic Sea: ¶Eisverhältnisse des Winters 1909-10 in ausserdeutschen Gewässern der Ostsee sowie an der holländischen Küste . . . russischen und schwedischen, usw., 71*

Bamboo Pulp as the Paper Material of the Future. H. Vincent, 719*

Banana and its Relatives. F. Adams, 794*; Banane und ihre Verwertung als Futtermittel. Dr. M. Zagorodsky, 952* ¶Map: Verbreitung der Bananenkultur. Dr. R. Rung, 713*

- Bancroft, H. Reconnaissance of the Ore Deposits in Northern Yuma Co., Ariz., 947*
- Bangala. (État Ind. du Congo). Sociologie descriptive. C. van Overbergh et Ed. de Jonghe, *rev.*, 303
- Bangweolo: ¶Sul Lago Bangweolo. Capt. M. Piscicelli, 68* ¶Map: Sketch Map of S.-E. corner of — Swamps, 956*
- Banks, N., *joint author*, see Wm. Ashmead.
- Banks, Sir Joseph: The "Father of Australia." J. H. Maiden, *rev.*, 141
- Banse, E. Geographische Bedeutung der Araber, 155*; Kurdistan — ein länderkundlicher Begriff, 951*; —s Reise im nördl. Mesopotamien. 1908, (Map), *n.*, 310
- Bantu Languages. Living Speech in Central and South Africa. Essay Introductory. A. C. Madan, *rev.*, 925
- Baratta, M. Catastrofe sismica Calabro Messinese, *n.*, 145
- Barbados, Agricultural Labour Conditions of. J. R. Bovell, 475*
- Barber, J. W., and H. Howe. Historical Collections of the State of New York, etc., 236*
- Barbey, Albert, Carte —. Chaîne du Mont-Blanc. X. Imfeld et L. Kurz, *n.*, 551
- Barbour, V. Privateers and Privates of the West Indies, 636*
- Baren, J. van. Morphologische Bau des niederländischen Diluviums nördlich vom Rhein, 71*
- Barker, E. R. Buried Herculaneum, *rev.*, 220
- Barlow, A. E., *joint author*, see F. D. Adams.
- Barneaud, Ed. Le Tunnel du Simplon, 316*
- Barrera, A. Guinea española, 951*
- Barrett, O. W. Impressions and Scenes of Mozambique, 224*
- Barringer, D. M. Meteor Crater in northern central Arizona, 788*
- Barrows, Dr. D. P. Conservation Policy for the Philippines, 477*; Negrito and Allied Types in the Philippines, 397*
- Barrows, H. H., *joint author*, see E. Blackwelder.
- Barth, Dr. C. G. Ueber das Schulwesen unserer Schutzgebiete, 639*
- Barth, H. von. Aus den nördlichen Kalkalpen, 239*
- Bartholomew, J. G. Literary and Historical Atlas of Europe, *rev.*, 382; Map of Mexico, *n.*, 634*
- Baschin, O. Beschaffenheit der oberen Schichten unserer Atmosphäre, 953*; Bibliotheca Geographica. Jahresbibliographie usw., *n.*, 150; Shackletons Südpolarexpedition und ihre Ergebnisse, 227*
- Basel, Temperaturverhältnisse von. W. Strub, 227*
- Basilicata, Danni prodotti dai terremoti nella — e nelle Calabrie. Prof. G. Mercalli, *n.*, 145
- Bassler, R. S. Cement Resources of Virginia west of the Blue Ridge, 880*
- Bastin, E. S. Geology of Pegmatites and Associated Rocks of Maine, 714*
- Batavia, Ethnographica Museum van het Bataviaasch Genootschap van Kunsten en Wetenschappen te. J. W. Teillers, 72*
- Bauer, L. A. Broader Aspects of Research in Terrestrial Magnetism, 317*; Circumnavigation Cruise of the "Carnegie" for 1910-13, etc., 317*; Department of Terrestrial Magnetism, Carnegie Institution, Report for 1910, 479*; Summary of Work — 1910-11, 560*; Gravity Determinations at Sea, 399*; Physical Theory of the Earth's Magnetic and Electric Phenomena. No. IV: Origin of the Earth's Magnetism, 720*; Bauer, L. A. and W. J. Peters. Magnetic Chart Corrections Found on First Cruise of "Carnegie" 1909-10, 317*
- Baulig, H. Écoulement fluvial et dénudation d'après les travaux de U. S. Geol. Survey, 560*
- Bavaria: ¶Jahresbericht der königlich bayerischen Post und Telegraphenverwaltung für 1909, 227*; Staats-eisenbahn Verwaltung, 1909, 398*; ¶Map of: Schulwandkarte vom Königreich Bayern. M. Kuhnert, *n.*, 235
- Beaches: Raised Beaches and Head of Cornish Coast. W. Rogers, 316*; Über Stranddünen und ihre Befestigung. W. Stavenhagen, 872*
- Beal, F. E. L. Birds of California in Relation to the Fruit Industry, 221*
- Bealby, J. T. Fruit Ranching in British Columbia, *rev.*, 298
- Bean, R. B. Philippine Types, 397*; Racial Anatomy of the Philippine Islanders, *rev.*, 783; Types of Negritos in the Philippine Islands, 477*
- Beattie, J. C. Report of Magnetic Survey of South Africa, *n.*, 926
- Beaverdell District, West Fork of Kettle R., B. C. L. Reinecke, 949*
- Beazley, C. R. Prince Henry of Portugal and the African Crusade of Fifteenth Century, 317*

- Bechuanaland, Map: Mafeking. Portion of Marico and Lichtenburg Districts, 159*
- Beck, Hon. Adam. Conservation of Water-Powers of Ontario, 475*
- Becker, Prof. F. Kunst in der Kartographie, 73*, 399*
- Becker, F. Neue Anforderungen an das Landesvermessungswesen und an Topographie und Kartographie, 399*
- Beckering, J. D. Beschrijving der Eilanden Andonara en Lomlem, etc., 638*
- Beekman, A. A. Wat de Afsluiting en Droogmaking der Zuiderzee Eigenlijk Beteekent, 639*
- Bégin, E. Voyage pittoresque en Suisse, en Savoie et sur les Alpes, 237*
- Belgium: ¶La Belgique moderne. H. Charriaut, *n.*, 933; Diminution de la natalité en Belgique, 157*; Esquisse de Géographie botanique de la Belgique. J. Massart, *n.*, 144; Mouvement de la population, 792*
- Belin, J.-L. Le Simplon et l'Italie septentrionale, 237*
- Bell, E. Y. Republic of Panama and its People . . . Reference to Indians, 314*
- Bell, G. Map showing Route from Aleppo to Konja, 957*
- Bell, J. M. Physiography of Wellington Harbor, 190
- Belz, J. O., *joint author*, see L. J. Briggs.
- Bencke, A. Tschadsee in Gegenwart und Vergangenheit (Maps), 877*
- Bendrat, T. A. Geologic and Petrographic Notes on the Region about Caicara, 715*, 790*
- Bengal: The Garos. Maj. A. Playfair, *n.*, 65
- Bennett, G. Wanderings in New South Wales, Batavia, Pedir Coast, Singapore and China . . . 1832, 239*
- Bent, A. H. Bibliography of White Mountains, *n.*, 781
- Benue R. Completely explored by Capt. Strumpel, 288
- Bérard, V. Russian Empire and Czarism, 319*; Le Sultan, l'Islam et les Puissances, *rev.*, 699
- [Berchem, J. P. Berthout van]. Itinéraire de la Vallée de Chamonix, d'une partie du Bas-Vaillais et des Montagnes avoisinantes, 320*
- Bergeat, Dr. A. Granodiorita de Concepción del Oro en el Estado de Zacatecas y sus Formaciones de Contacto, 475*
- Bergen, Klima von. Niederschläge, N. J. Föyn, 316*
- Bergeron, F., *joint author*, see C. Dufart.
- Berget, Prof. A. Commission Intern. pour Exploration scientifique de l'Atlantique, 73*
- Bering Sea: Fur Seals of, 286 ¶Chart: Eastern Part of —. (U. S. Coast and Geod. Surv.), 545*
- Berkey, C. P. Geology of New York City (Catskill) Aqueduct, 553*
- Berlin: ¶Berlin. Principal centre de la circulation continentale en Europe. Prof. T. Fischer, 558*; Travels from — through Switzerland to Paris in 1804. A. v. Kotzebue, 238*
- Bernard, Lieut. A. Croquis schématique des régions de l'Ouest du cercle de Colomb (Map), 78*; Étude d'une zone frontière. Confins algéro-marocains, 790*; Montagnes d'Algérie, 69*; Notes sur l'oued Gheris et ses affluents, 476*; L'œuvre française dans les Confins Algéro-Marocains et ses Résultats politiques, 223*; Quelques rectification à la carte du Maroc. Vallée de la Moulouya, 556*
- Berners Bay Region, Alaska, Geology of. A. Knopf, 635*; ¶Maps: Geological and Topographical, 228*
- Bernhard, Duke of Saxe-Weimar Eisenach. Travels through North America . . . 1825 and 1826, 318*
- Bernier's Return from the Arctic, 920
- Bertacchi, G., *joint author*, see G. Dalla Vedova.
- Berthaut, Gén. H. Topologie, Étude du Terrain, *rev.*, 361
- Berthaut, L. Agrandissement du Havre, avant-port de Paris, 638*
- Bertrand, A. Dans le Sud-Africain et au seuil de l'Afrique Centrale, *n.*, 927
- Bhutan: Le Bhoutan et son Développement historique. C. E. Bonin, 556*
- Bibliographies. See also Catalogues and Indexes: ¶Bibliography of Æolian Geology. S. C. Stuntz and E. E. Free, 953; Bibliography of North American Geology for 1909 with Subject Index. J. M. Nickles, 66*; Bibliotheca Geographica. Jahresbibliographie usw. Dr. O. Baschin, *n.*, 150; Brief List of Meteorological Text-Books and Reference Books. C. F. Talman, *n.*, 220; Catalogus der Koloniale Bibliotheek . . . Kon. Inst. voor de Taal, Land en Volkenk. van Ned. Indië. Aanwinsten, 156*; List of Geographical Atlases in the Library of Congress, *rev.*, 312; Liste alphabétique des plans et vues de Villes, Citadelles et Forteresses . . . dans le grand Atlas de

- Mortier, Édition de Amsterdam, 1696.
 Sir Herbert Fordham, 640*; List of Publications. Bureau Amer. Ethnology, 151*; Recent Bibliography of Caroline Islands, 510; — of Sierra Leone. H. C. Lukach, *n.*, 781; — of White Mountains. A. H. Bent, *n.*, 781; — of Writings of R. E. C. Stearns. M. R. Stearns, 789*; Trees, Forestry and Lumbering. List of Books and of Reference to Periodicals, etc., 952*
- Bickel, F. W. Wirtschaftliche und politische Lage in Britisch-Indien, 870*
- Bieber, F. J. Reise nach Harar und Adis Abeba, 67*
- Biermann, C. Le Jorat. Esquisse géographique, 478*
- Bigelow, F. H. Inversion of Temperature Amplitudes and Departures in the U. S., 221*; Status of Modern Meteorology, 399*; Personal, 54
- Bighorn Basin, Wyo. Coal Field in S. E. Part of. E. G. Woodruff, 152*
- Bigland, J. Geographical and Historical View of the World . . . With Notes by Jedidiah Morse, 239*
- Bingham, H. Across South America, *rev.*, 694; Potosi, 1; Ruins of Choquequirau, 476*, 720*; Yale Expedition to Peru, 287
- Biogeography, Shackleton's Contribution to. C. H. T. Townsend, 479*
- Bird Migration: Bird Migrations and Weather. Dr. W. R. Eckardt, 198; Our Greatest Travelers. Birds that fly from Pole to Pole, etc. W. W. Cooke, 788*
- Birds of Europe and North America, Geographical and Comparative List of. Charles Lucien Bonaparte, 320*
- Birkinbine, J. Our Neighbor, Mexico, 868*
- Biro, J. Statistique annuelle de Géographie comparée, *rev.*, 466
- Bismarck Archipelago, Maps: Maps showing results of surveys by Dr. Sapper, Friederici and Others, *n.*, 232; Maps by Dr. K. Sapper, *n.*, 233
- Bithynia: Quer durch Bithynische Halbinsel. Dr. W. Endriss, 155*
- Blackfeet Indians, The Old North Trail, etc. W. McClintock, *n.*, 533
- Blackiston, A. H. Recent Discoveries in Honduras, 475*
- Blackwelder, E. New Light on Geology of Wasatch Mountains, Utah, 635*; — and H. H. Barrows. Elements of Geology, *rev.*, 939; see also H. S. Gale, *joint author.*
- Blair, W. R. Free Air Data, Mt. Weather, April, May, June, 1910, 394*
- Blanchard, C. J. Lecture on Arid Regions of the U. S. and Reclamation Service, 51
- Blanchard, R. Limite septentrionale de l'olivier dans les Alpes françaises, 558*; Le village de Saint-Véran, 315*
- Bland, J. O. P. and E. Backhouse. China under the Empress Dowager, *rev.*, 460
- Blatchley, R. S. Illinois Oil Fields in 1910, 394*, 635*; Oil Investigations in Illinois, 788*; Oil Resources of —, 474*
- Blázquez, A. Descripción de las costas y puertos de España de Pedro Teixeira Albernás, 227*
- Blonck, W. A. Recent European Progress in Dirigible Balloons, 318*
- Blondel, G. Développement de la Hongrie, 792*; Paris port de mer, 952*; La situation économique de l'Allemagne, 226*
- Bodeli et Borkou (Mission Tilho), Map, *n.*, 231
- Boers: Die Wurzeln der Kapholländischen Volksüberlieferungen. F. T. Schonken, 72*
- Bohemia and the Čechs. History, People, etc. W. S. Monroe, *n.*, 144
 ¶ Maps of Bohemia; Geol. Map of Vostroy Fault Region, 473*; Königreich Böhmen und Erzherz. Böhmen-Eger. H. Hanau, 233*
- Böhmerwald: ¶ Morphologie des Böhmerwaldes. Dr. H. Mayr, *rev.*, 46; 397* ¶ Maps of Böhmerwald: Karte der Niederschlagshöhen im, 234*; Kartenskizze der Temperaturverhältnisse im, 234*; Übersichtskarte des Bayerisch-Böhmischen Waldgebirges, 234*
- Bohol, Western, Chart U. S. Coast and Geod. Surv., 158*
- Bokhara: Gebirgspässe des Chanats Buchara. Nach russischen Quellen übersetzt von Oberleut. O. Muszynski, 556*, 951*
- Boland, J. P. Commerce de l'Irlande avec les pays étrangers, 478*
- Bolivia: ¶ Arbitraje entre . . . Bolivia y el Perú y su última negociacion sobre fronteras, *n.*, 302; Cuestión de Límites entre el Paraguay y Bolivia. A. Audibert, 720*; Economic Conditions of. I. Calderon, 395*; Explorations in. Dr. T. Herzog, 525; Exploration ethnograph. et archéol. en — 1908-9. E. Nordenskiöld, 475*; Further Explorations in: River Heath. Maj. P. H. Fawcett, 555*; Geography of Natural Resources, 395*; Mineral Resources and Industry, 950*; Minería

- de estaño en. W. Gray and A. L. Halden, 950*; Note on Map of S. Peru and N. Bolivia. E. A. Reeves, 395*; Remarks on Arbitral Sentence . . . Boundary Question between Bolivia and Peru. P. Fiore, 800*; Siriono-Indianer in Ostbolivien. E. v. Nordenskiöld, 395* ¶ Map of Bolivia: River Heath and Adjacent Territory. Maj. P. H. Fawcett, 391*
- Böllert, P. Volksdichte in der Oberen Gangesebene (Map), 472*
- Bologna, Map of, n., 311
- Bolster, R. H., joint author, see C. C. Covert; R. Follansbee; and N. C. Grover.
- Bonaparte, Charles Lucien. Geographical and Comparative List of the Birds of Europe and North America, 320*
- Bongrain, M. Carte provisoire de l'Antarctique sud-américaine, facing p. 81
- Bonin, C. E. Le Bhoutan et son Développement historique, 556*
- Bonney, Prof. T. G. Some Aspects of Glacial History of Western Europe, 70*
- Bonomi, Joseph, et al. Egypt, Nubia and Ethiopia, 319*
- Book Reviews and Notices, 61, 139, 205, 295, 373, 455, 531, 625, 693, 781, 863, 923
- Borchgrave, Baron de. Quelques mots sur la science américaniste au début du XX^e siècle, 474*
- Boring, The Deepest, 622
- Borneo: Some Contributions to the Physiography and Hydrography of North-East. I. A. Stigand, 224* ¶ Maps of Borneo: Geol. Overzichtskarte van de landen om de Balik-Papan-Baai, 877*; Part of North East Borneo, 160*
- Bornholm, Über die Morphologie von. Dr. G. Braun, 226* (Borrmann, R.) Die Funde von Olympia, 237*
- Böse, E., and F. Toulia. Zur jungtertiären Fauna von Tehuantepec, 314*
- Bosnia. See also Herzegovina: ¶ Unterirdisch entwässerte Gebiete in Innerbosnien. Dr. M. Hoffer, 638*; Wanderung durch das östliche Bosnien, Montenegro und Albanien. L. Edlinger, 477*; Bosnia-Erzegovina sotto l'aspetto storico, giuridico et economico. G. Giacchi, 157*
- Boston: ¶ List of Maps of — Published Subsequent to 1600, 222*; Survey of Boston and Vicinity . . . with Topographical Sketches of the County. J. G. Hales, 560* ¶ Charts: Boston Harbor, — Inner Harbor, U. S. Coast and Geod. Surv., 157*
- Botty, P. A. Aux Ortos. Pays et mission, n., 64
- Bougainville, Eine Durchquerung durch. K. Sapper, 226* ¶ Map of: Aufnahmen auf Bougainville, 1908. Dr. K. Sapper, n., 233
- Boule, M. La Haute-Loire et le Haut Vivarais, n., 947
- Boulenger, G. A. Catalogue of Fresh-Water Fishes of Africa in the British Museum, Vol. I, 314*, Vol. II, 800*
- Boulogne: Statistiques. Année 1909, Chambre de Commerce, 71*
- Boundaries: ¶ Boundary between Liberia and Ivory Coast, 855; Frontera Argentina Brasileña, 868*; Zur Geographie der politischen Grenzen. Dr. H. Walser, 318*; German-Dutch Boundary Expedition in New Guinea, 369; Limites actuelles du Brésil par suite des derniers arbitrages et traités. M. de Oliveira Lima, 868*; Remarks on Arbitral Sentence . . . Boundary Question between Bolivia and Peru. P. Fiore, 800*; Togo-Dahomey-Grenzvermessungs-Expedition. A. v. Seefried, 870* ¶ Maps of Boundaries: Demarcación de Límites con Chile. Region de la Puna. Z. Sánchez and T. Loos, 955*; Frontière Franco-Libérienne, 956*; Neue Grenze zwischen Belgisch-Kongo u. Deutsch Ost-Afrika, 547*; Portugiesische Grenzgebiet gegen Deutsch-Südwestafrika zum Verfolg der militärischen operationen im Distrikt Huilla, 547*; Projet de délimitation (between French Guinea and Liberia), 955*; Sahara Oriental. (Shows Franco-Tripolitan Boundary), 955*
- Bourée, H. Carte générale bathymétrique des Océans, 73*
- Bourge, Comm. G. Le port de Rio-de-Janeiro et ses travaux d'amélioration, 868*
- Bourrit, M. T. Description des Aspects du Mont Blanc . . . Présenté à sa Majesté le Roi de Sardaigne, 320*; Nouvelle Description des Vallées de Glace . . . des Alpes, etc., 237*; Nouvelle Description des Glacières . . . qui forment la Grande Chaîne des Alpes de Savoye, de Suisse et d'Italie, 238*
- Bourrit, T. Relation of a Journey to the Glaciers in the Duchy of Savoy. Transl. by C. and F. Davy, 238*
- Bovell, J. R. Agricultural Labour Conditions of Barbados, 475*

- Bowie, W. Great Arc of Triangulation (Texas-Cal.), 447
- Bowman, I. The Amazon, 555*; Expedition in Peru, 685
- Bownocker, J. A. Mineral Resources of Ohio, 714*
- Bow River Valley, Alberta, Pre-Cambrian Rocks of. C. D. Walcott, 222*
- ¶ Map of: Bow River Valley — between Bow Peak and Castle Mountain Station, 77*
- Braam Houckgeest, André Everard van. Voyage de l'Ambassade de la Compagnie des Indes Orientales Hollandaises . . . 1794 & 1795, etc., 237*
- Brady, Hon. J. G., Lecture on Alaska, 365
- Brahmaputra: Source principales du Brahmapoutre et du Sutledje. A. H. Savage Landor, 225*
- Brand, The Hon. R. H. Union of South Africa, *rev.*, 205
- Brandstetter, R., Gemeinindonesisch und Urindonesisch, 720*
- Branner, J. C. Geology and Topography of Serra de Jacobina, Bahia, 476*; Geological Work of Ants in Tropical America, 293, 394*; Minerals associated with Diamonds and Carbonados in Bahia, 715*; Map to illustrate paper on N. E. Bahia, 796*; Sketch Map of Approximate Limestone Areas of the Interior of Bahia, 796*; — to explore western part of the north coast of Brazil, 197
- Bransford, J. F. Archaeological Researches in Nicaragua, 720*
- Braun, Dr. G. Über die Morphologie von Bornholm, 226*; Über Bodenbewegungen, 317*
- Brazil: ¶ Almanaque Brasileiro Garnier para o anno de 1909, 223*; Anuario publicado pelo Observatorio do Rio de Janeiro para os Annos de 1909-1910, 67*; With an automobile off the Brazilian Highway, 950*; Boletim mensal do Observatorio do Rio de Janeiro, Abril-Dez., 1908, 152*; Dr. Branner to explore western part of north coast of, 197; Le Brésil au XX^e siècle. P. Denis, *rev.*, 626; English transl., *rev.*, 924; Brasile. Lo Stato di Goyaz. E. Axerio, 715*; Brazil and Her People of To-Day. N. O. Winter, *rev.*, 63; Au Brésil. Du Rio São Francisco à l'Amazonie. P. Walle, *n.*, 534; Contribuições recentes para a cartographia do. O. A. Derby, 152*; Développement des chemins de fer au Brésil, 395*; Frontera Argentino Brasileña, 868*; Iron Ores of, 555*; Itinerario da Expedição Espinhosa em 1553, 153*; Limites actuelles du Brésil par suite des derniers arbitrages et traités. M. de Oliveira Lima, 868*; Madeira-Mamoré R. R. P. H. Ashmead, 636*; Navegação na costa do Rio Grande do Sul. A. Alves Dos Santos, 715*; Revista do Museu Paulista. H. v. Ihering, 960*; Rietsuiker-industrie van productie. Brazilie. H. C. Prinsen Geerligs, 222*; Territoire fédéral l'Acre et la ligne du Madeira au Mamoré. P. Walle, 636*; Through Wildernesses of W. A. Cook, *rev.*, 302 ¶ Maps of Brazil: Brazil segundo os mais recentes Trabalhos. R. Hausermann, 876*; Forschungsreise des Dr. Hamilton Rice im Flussgebiet des Rio Caiary-Uaupés, 707*; Portion of Brazil showing relative position of Diamond Fields, 955*; Republica dos Estados Unidos do Brazil, 634*
- Breckenridge District, Col., Maps, 954*
- Brehm, Dr. V. Einfluss glazialer und postglazialer Verhältnisse auf die niedere Tierwelt Mitteleuropas, speziell auf deren geog. Verbreitung, 718*
- Breitung, Dr. E. Wollschafzucht in Deutsch-Südwestafrika, 556*
- Bremen: Jahrbuch für Statistik, 1910, 478*
- Brenier, H., *joint author*, see H. Rus-sier.
- Brennecke, Dr. W. Forschungsreise S. M. S. Planet; 1906-7: Reisebeschreibung, Aerologie und Ozeanographie, *n.*, 212; Ozeanographische Arbeiten der Deutschen Antarktischen Expedition, 952*; Tiefsee-Forschungen der "Planet"-Expedition, 1906-07, 72*; Weitere Mitteilungen über die geplante Deutsche Antarkische Expedition, 227*
- Brennerbuch. Naturansichten und Lebensbilder aus Tirol. H. Noë, 238*
- Brent, C. H. Progress and Problems in the Philippines, 477*
- Breslau, Die Geologischen Verhältnisse der Umgebung von. O. Tietze, 558*
- Breton [de la Martinière, J. B.]. China: its Costume, Arts, etc., 236*
- Bretz, J. H. Terminal Moraine of the Puget Sound Glacier, 714*
- Bridges, J. H., *joint author*, see R. W. Richards.
- Bridgman, H. L. History of Field Work of Peary Arctic Club, 872*; The Sudan To-day and To-morrow, 716*

- Brien, V. Gites métallifères du Congo Belge, 790*
- Briet, L. Barrancos et Cuevas (Haut-Aragon-Espagne), 719*
- Briggs, L. J., and J. O. Belz. Dry Farming in Relation to Rainfall and Evaporation, 523.
- Brigham, A. P. Commercial Geography, *rev.*, 940; Distribution of Population in the United States, 947*
- Brigham, W. T. Volcanoes of Kilauea and Mauna Loa, etc., *n.*, 141
- Bright, C. Imperial Telegraphic Communication, *n.*, 947
- Brindle, E. With Russian, Japanese and Chunchuse. Experiences of an Englishman during the Russo-Japanese War, 320*
- Briquet, A. Sur la morphologie de la partie médiane et orientale du Massif Central, 718*
- Britain: See under Great Britain.
- British Columbia: ¶ Across the Purcell Range of —. Dr. T. G. Longstaff, 868*; Beaverdell District, West Fork of Kettle R. L. Reinecke, 949*; Fruit Ranching in. J. T. Bealby, *rev.*, 298; Geology of Victoria and Saanich Quadrangles. C. H. Clapp, 948*; Ice River District. J. A. Allan, 948*; Parts of Similkameen and Tulameen Districts. C. Camself, 948*; Portions of Atlin District. D. D. Cairnes, 948*; Portland Canal District. R. G. McConnell, 949*; Reconnaissance in East Kootenay. S. J. Schofield, 949*; Skeena R. District. W. W. Leach, 949*; Slokan District. O. E. Leroy, 949* ¶ Maps of British Columbia: Index to Townships in British Columbia, etc., 230*, *n.*, 390; Map of Boundary between — and Yukon Territory from Tatschenshini R. to Teslin Lake, *n.*, 231; Map of Vancouver Island, *n.*, 955; Outline Sketch of Northern Part of Purcell Range, 633*; Part of Selkirk Range Adjacent to Mount Sir Sandford. H. Palmer, 310*; Sketch Map of Part of Railway Belt, *n.*, 230; Sketch Map showing mineral locations of Atlin Mining District, 796*; Sketch map of Portland Canal Mining District, 796*; South-Western Part of, *n.*, 158
- British Empire: Cables and the Empire. R. MacMillan, 316*; State-Owned Trans-Atlantic Cable, 60; Imperial Telegraphic Communication. C. Bright, *n.*, 947; Cotton Growing in the, 620; Cotton Growing within the. J. H. Reed, 792*; Enseignement aux indigènes, *n.*, 149; Geographical Aspects of the Problem of Cotton Growing in. J. H. Reed, 399*; Oil Fields of the Empire, etc. J. D. Henry, *rev.*, 148
- British Guiana. See under Guiana.
- British Isles. See under United Kingdom.
- British New Guinea. See Papua.
- Brittany: Alte Sitten in der Bretagne. Dr. H. Schoen, 315*
- Brockedon, W. Journals of Excursions in the Alps, 238*
- Brooks, A. H. Alaska Coal and its Utilization, 474*; Mining Industry in 1909, 553* ¶ —, and L. M. Prindle. Geological Reconnaissance Map of Mount McKinley region, 795*
- Brooks, B. T. Natural Dyes and Coloring Matters of the Philippines, 718*
- Broomhall, M. Islam of China. A Neglected Problem, *rev.*, 782
- Brounow, Prof. P. Abhängigkeit einiger geographischen Elemente von dem barischen Relief der Erdoberfläche, 73*
- Brown, C. M. Coconuts in the Americas, 313*
- Brown, G. Melanesians and Polynesians. G. Brown, *rev.*, 463
- Brown, R. M. Geography of Worcester, Mass., 366; Review of Waterway Problem, 573; World's Great Rivers. The Mississippi, 474*
- Brown, R. N. R. British Work in Spitsbergen: Some Historical Notes, 639*
- Brown, W. R. Forestry Progress in New Hampshire, 474*
- Bruce, Col. Sir David, and Others. Further Researches on the Development of *Trypanosoma gambiense* in *Glossina palpalis*, 794*
- Bruce, W. S. Polar Exploration, *rev.*, 785; Scottish Exploration in Prince Charles Foreland 1906-7, 872*
- Bruck, Dr. W. F. Studien über den Hanfbau in Italien, 719*, 793*
- Brückner, Dr. Ed. Bericht der international. Gletscherkommission für 1907-10, 794*; Italienisch-österreichische Projekt einer gemeinsamen Erforschung des Adriatischen Meeres, 73*; Variations périodiques des glaciers. Alpes orientales, 477*; Vorläufiger Bericht über die erste Kreuzungsfahrt *Najade* in der Hochsee der Adria, 718*
- Bruhns, Dr. B. Geographische Forschungsreisen und ihre Ziele, *rev.*, 215
- Brunhes, J. Géographie humaine. Essai de Classification, *rev.*, 467;

- Méthode de l'échantillonnage topographique au service de morphologie, 74* ¶ Jean — e l'opera sua. A. Michieli, 639*
- Brünn, Map: G. Freytag's Automobil- und Radfahrer-Karte, 79*
- Brunnthaler, J. Viktoriafälle des Sambesi und ihre Umgebung, 717*
- Bryant, H. G. Notes on Early American Arctic Expedition, 872*
- Buccaneers in the West Indies in the XVIIth Century. C. H. Haring, *rev.*, 457
- Buckwald, O. von. Zur Völkerkunde Südamerikas, 475*
- Buenos Aires, Bulletin of Municipal Statistics, 395*
- Bührer, Lieut. Carte du Pays Mahafaly, 391*
- Buka. Nach Aufnahmen von G. Friederici u. Bergingenieur Schön sowie eigenen Beobachtungen von Prof. Dr. K. Sapper, 226* ¶ Maps of: Buka. Dr. K. Sapper, *n.*, 233; Geologische Kartenskizze von. Dr. K. Sapper, *n.*, 233
- Bulgaria: ¶ Durch das Strumadefilee nach der bulgarischen Thermenstadt Küstendil. F. Meinhard, 315*; Griechen und Bulgaren im neunzehnten und zwanzigsten Jahrhundert. Prof. N. Kasasis, *n.*, 144; Population of (1910), 689; Preliminary results of the Census, 1910, 638*; Statistics of Commerce of Bulgaria with foreign countries, 1909, 558* Map of Bulgaria: Situationsplan der Eisenbahnstrecke Radomir-Küstendil, 79*
- Bumpus, T. F. Cathedrals of Northern France, *n.*, 702
- Bunker, A. Sketches from Karen Hills, *n.*, 65
- Burchard, E. F. Production of Iron Ore, Pig Iron and Steel in U. S. in 1909, 284; —, A. H. Purdue and Others. Structural Materials. Metals and Nonmetals, Except Fuels, 221*
- Burckhardt, Dr. C. Estudio Geológico de la Region de San Pedro del Gallo, 222*
- Bureau of Insular Affairs, Report for 1910, 867*
- Burma: ¶ The Burman, His Life and Notions. S. Yoe, *rev.*, 305; Geology and Prospects of Oil in Western Prome and Kama. M. Stuart, 556*; Sketches from the Karen Hills. A. Bunker, *n.*, 65
- Burmester, Dr. H. Einige Beobachtungen über tropische Schutzkrusten und Wadibildungen, 73*
- Burnett, F. Through Tropic Seas, *n.*, 380
- Burpee, L. J. Canoe Routes from Lake Superior Westward, 394*
- Burroughs, J., J. Muir and G. B. Grinnell. Alaska Narrative, Glaciers, Natives. (Harriman Alaska Series), 480*
- Burton, J. H. Cairngorm Mountains, 238*
- Bushman: Die Auin. Beitrag zur Buschmannforschung. H. Kaufmann, 154*; Buschleute der Namib, ihre Rechts- und Familienverhältnisse. Oberleut. Trenk, 154*
- Businger [J.] Itinéraire du Mont-Righi et du Lac des 4 Cantons . . . description de Lucerne, etc., 238*
- Buss, E., and A. Heim. Bergsturz von Elm den 11 Sept., 1881, 238*
- Busson, H., J. Fèvre et H. Hauser. La France et ses Colonies, *n.*, 148
- Büttikofer, J., Notizie sulla Repubblica di Liberia. Specialmente Secondo i Viaggi e gli Studi di —. Prof. G. Cora, 637*
- Butts, C. Southern Part of Cahaba Coal Field, Ala., 867*; Maps and Sections, 629; — M. R. Campbell and Others. Coal and Lignite, 553*; see also J. S. Diller, *joint author*.
- Buzzards Bay, Vineyard Sound and —, Chart U. S. Coast and Geod. Surv., 158*

C.

- Cacahuamilpa, Excursion a la Caverna de — y Ascension al Crater del Popocatepetl. E. Landensio, 236*
- Cacao, Production et consommation du. P. Clerget, 479*
- Cacqueray, Marquis de. Chez les Indigènes de la Nouvelle-Guinée Britannique, 225*
- Caiary-Uaupés, Forschungsreise der Dr. H. Rice im Flussgebiet des Rio —. Dr. T. Koch-Grünberg, 950*; Map, 707
- Caicara, Geologic and Petrographic Notes on the Region about —. T. A. Bendrat, 715*; 790*
- Caillié, R., Le Tafilet. D'après —, 716*
- Cairnes, D. D. Preliminary Memoir on Lewes and Nordenskiöld Rivers, Coal District, 475*; Portions of Atlin District, 948*
- Cairngorm Mountains. J. H. Burton, 238*
- Caix, R. de. Aspect présent de la question de Bagdad, 637*; Derniers développements de l'affaire marocaine,

- 951*; Les Évenements du Ouadai et la Mort du Colonel Moll, 224*; La question du Tibesti, 717*
- Cajamarca, Departamento de. F. Malaga Santolalla, 790* ¶Map: Cajamarca. F. Malaga Santolalla and C. Vallejos Z., 547*
- Calabria: ¶Catastrofe sismica Calabro Messinese (28 Dic., 1908). M. Baratta, *n.*, 145; Danni prodotti dei terremoti nella Basilicata e nelle Calabrie. Prof. G. Mercalli, *n.*, 145; A travers la Calabre. L. et C. de Fouchier, 227*
- Calamotta, Der Kanal von, *n.*, 145
- Calciati, Dr. C. Les Fronts des glaciers de Yengutsa et d'Hispar, 477*; Trois "boucles" de la Sarine (Map), 959*
- Calderon, I. Economic Conditions of Bolivia, 395*
- Caledonia. See Scotland.
- California: ¶Birds of California in Relation to the Fruit Industry. F. E. L. Beal, 221*; Carrying Water Through a Desert. . . Los Angeles Aqueduct. B. A. Heinly, 221*; Coal in San Benito Co. M. R. Campbell, 714*; Extension of the Known Area of Pleistocene Glaciation to the Coast Ranges of. R. S. Holway, 161*; Geographic Influences in the Development of. J. F. Chamberlain, 788*; Great Arc of Primary Triangulation. W. Bowie, 447; How to increase the Yield of Wheat in. G. W. Shaw, 714*; Impressions de Californie. Ascension du Tamalpais. E. Deschamps, 553*; Mineral Productions, County Maps and Mining Laws of. L. E. Aubury, 960*; State Mining Bureau, General Index Publications. L. E. Lewis, 960*; Oil and Gas in South Midway Field, Kern Co. W. Forstner, 553*; Prel. Report on Geology and Oil Prospects of Cantua-Panoche Region. R. Anderson, 394*; Serpentes of Central Coast Ranges of. H. E. Kramm, 151*; Three Years in. W. Colton, 236*; Über die Ursachen des Kalifornischen Erdbebens von 1906. A. Rothpletz, 714* ¶Maps of California: Alkali Map of Woodland Area, 229*; Approximate Location of Principal Mineral Deposits, 876*; Geological Map of Sargent Oil Field, 390*; Map of Twenty-two Spanish and American Trails and Routes Affecting —, 1694-1849, 799*; 19 outline county maps showing railroads and stage lines with distances between points, 795*; Soil Survey Map of Woodland Area, 229* ¶U. S. G. S. Maps: Administrative Map of Yosemite National Park. R. B. Marshall and A. H. Sylvester, *n.*, 77; Topographic Sheets of: Antelope, Arcade, Brighton, and Hawthorne Quadrangles, 873*; Parker Quad., 629*; Bruceville, Castle, Galt, Headreach, Isleton, Jersey, Knights Landing, Lincoln, Marcuse, New Hope, Nicolaus, Pleasant Grove, Rio Vista, Sheridan, Roseville, Vernon and Woodbridge Quadrangles, 75*; Furnace Creek Quad., 75*; Wheatland Quad., 398*; Topographic Survey of Southern —, 157*; Sketch Map of Trinity R. Basin showing areas of Auriferous Gravels of Second and Third Cycles of Erosion, 874* ¶Charts U. S. Coast and Geod. Survey: Mare Island Strait, 631*; Pacific Coast from San Diego to Santa Monica; from San Francisco to Point Arena, 875*; San Francisco Entrance, 309*; Southern Part of —, 631*; Santa Rosa Is. to Point Buchon, 631*
- California, Lower: ¶Land of Drought and Desert. Ten Thousand Miles . . . through Most Extraordinary Cacti Forest in the World. E. W. Nelson, 868*; Expedition to —, 195; Recherches anthropologiques sur la Basse-Californie. Dr. P. Rivet, 635* ¶Map of Lower California: Outline Map, 634*
- Calvert, A. F. Nigeria and Its Tin Fields, *rev.*, 928
- Calvin, Prof. Samuel, *Obituary*, 624
- Cambray, J. Voyage pittoresque en Suisse et en Italie, 238*
- Cameron, A. D. From Winnipeg to Arctic Ocean, 715*
- Cameroons: See Kamerun.
- Campbell, J. Información descriptiva sobre la provincia de San Juan, 715*
- Campbell, M. R. Coal in San Benito Co., Cal., 714*; Map of Black Mesa Coal Field, Ariz., 630*; — and H. E. Gregory. Black Mesa Coal Field, Ariz., 867*; — and E. G. Woodruff. Powell Mountain Coal Field, Va., 788*; see also A. H. Butts, *joint author*.
- Campbell, W. D. Geological Map of the Country between Arrino and Northampton, 232*; Irwin, R. Coalfield and adjacent districts (Western Australia), 557*
- Campbell, W. W. Return of Halley's Comet, 479*
- Camsell, C. Parts of Similkameen and Tulameen Districts, B. C., 948*

Canada, General: ¶ Across Sub-Arctic of. J. W. Tyrrell, 319*; Canada. The Land of Hope. E. W. Elkington, *rev.*, 300; Chez les Français du Canada. J. Lionnet, *rev.*, 61; Un voyage à travers le Canada français. R. Ernst, 949*; Climate and Physical Condition of Keewatin. A. P. Coleman, 394*; Colonisation of Western —, 715*; Constitution of. J. E. C. Munro, 319*; Dates importantes pour l'histoire de la découverte géographique . . . Canada. E. Petitot, 554*; Deux Voyages dans l'Amérique du Nord [Description of Cobalt and Schibogomo Districts]. M. A. de Romeu, 554*; Expedition to Spillimacheen Mountains. Photo-Top. Surveys. A. O. Wheeler, 868*; Exploring the Canadian Northwest, 185; Geologist's Paradise [Mountains]. C. D. Walcott, 868*; Heaton's Annual. Commercial Handbook, etc., *n.*, 544; Hudson Bay R.R., 152*; Population [Census 1911], 917; Progress of the Grand Trunk Pacific R.R., 917; H. I. Smith to Conduct Archaeological Survey of, 861; History of the "Canadian Shield." Prof. A. P. Coleman, 66*; H. V. Radford in Northern Canada, 134, 777; Riders of the Plains. Adventures . . . North-West Mounted Police. A. L. Hayden, *rev.*, 61; Saskatchewan R. District. W. McInnes, 949*; Sport and Travel in the Northland of. D. T. Hanbury, 236* ¶ Decisions Geographic Board of Canada, 66, 394, 554, 635, 715, 949* ¶ Economic: Conservation of Agricultural Resources. Dr. J. W. Robertson, 554*; Conservation of the Protection of Nature. C. G. Hewitt, 789*; Forest, Lake and Prairie. 20 Years of Frontier Life in W. Canada. (John) McDougall, 400*; Fur-Bearing Animals of — and How to Prevent their Extinction. F. T. Congdon, 475*; Immigration into, 286; Industrial Development of. E. T. Powell, 554*; A Railroad's Forest Enterprise, 685 ¶ Government Reports: Annual Report, Topographic Survey Branch, 1908-9, 475; 1909-10, *rev.*, 455; Commission of Conservation, Report First Annual Meeting, 554*; Rep. on Traverse through southern Part of North West Territories from Lac Seul to Cat Lake. A. W. G. Wilson, 554*; Report on Part of N. W. Territories drained by Winisk and Attawapiskat Rivers. W. McInnes, 554*; Summary Rep. Geol. Surv. Branch Dep. of

Mines, for 1910, 715* ¶ Minerals and Mining: Clay Resources of Western Provinces. J. Keele, 949*; Clay and Shale Deposits of Western. H. Ries, 949*; Department of Mines of Canada, its Organization and its Work. A. W. G. Wilson, 475*; Descriptive Sketch of Geology and Economic Minerals of. G. A. Young, *rev.*, 455; Mineral Production of — in 1910, 635*; Possible Economies in Production of Minerals of Canada. Dr. E. Haanel, 554* ¶ Maps of Canada: Braeburn-Kynocks and Tantalus Coal Areas, 230*; Cereal Maps of Manitoba, Saskatchewan and Alberta, *n.*, 159; Chart of Magdalen Islands, 796*; Explored Routes on parts of Albany, Severn, and Winisk Rivers, etc., *n.*, 230*; Indexed Pocket Map of Saskatchewan, 796*; Index Map to . . . Maps published by Dep. of Militia and Defence, *n.*, 955; Index to Townships in Manitoba, Saskatchewan, Alberta and British Columbia, 230*; *n.*, 390; Lake Nipigon, Thunder Bay District, 230*; Map of Abitibi Region indicating surveyed Townships traversed by the Transcontinental R.R., etc., 633*; Map of Canada. Geology, 390*; Minerals, 390*; Map showing Glacial Geology of the U. S. and —, *n.*, 954; Map of Western Canada. R. E. Young, *n.*, 77; Mineral Map, 796*; Prince Edward Island, Nova Scotia and New Brunswick. R. E. Young, 78*; Proposed Forest Reserve on Eastern Slope of the Rocky Mts., 230*; Resource Map of —, 1911, 955*; Sketch Map of Dalhousie showing relation of eruptive mass and its apophyses to the Devonian marine sediments; Sketch Map of Devonian fish locality at Migouasha, 796*; Sketch Maps showing topography of Base Lines and Meridians in Alberta and Saskatchewan, 390*; Sketch Plan showing Topography of Eleventh Base Line across Ranges 8 to 19, west of fifth Meridian, *n.*, 230; Sketch Maps showing Mineral locations of Atlin Mining District, B. C., 796; Portland Canal Mining District, 796*; Top. Sketch of Portion of Jasper Park, 796*; Standard Topographical Map, 390*, 546*; Vicinity of the National Transcontinental R.R. Abitibi District, 633* Canary Islands: Les îles Canaries. F. Longrée, 791* Candler, E. Mantle of the East, *n.*, 65 Canning, A. W. Wiluna-Kimberley

- Stock Route by —, 1906-07 (Map), 798*; Expeditions in Western Australia, 952*
- Canon City Coal Field. Col. C. W. Washburne, 152*
- Canzio, E. Alpinisme sans guide, 318*
- Cape Cod Bay, Chart U. S. Coast and Geod. Surv., 76*
- Cape Colony (Province of the Cape of Good Hope): ¶ Annual Report, Geol. Commission, 1909, 716*; Colonia del Capo. P. Pasi, 950* ¶ Map of: Geologic Map of the Province, *n.*, 472; Kärtchen der Eisbewegung zur Wykta-Eiszeit am Oranje und Vaal, 708*
- Capitan, Dr. Le XVI^e. Congrès International des Américanistes, 228*
- Capps, S. R. Underground Waters of North-Central Indiana, 714*; see also F. H. Moffit, *joint author*.
- Capra, Dr. G. Italiani in Australia, 871*; Nuova Zelanda (Una Italia Australe), 718*
- Capus, Dr. G. Spécialisation des Jardins botaniques dans les recherches d'agriculture tropicale, 479*
- Caracas, Ferrocarril de la Guaira a —. J. Flind, 636*
- Card, E. R. de. La France et la Turquie dans le Sahara oriental, 480*
- Caribbean, Colonization of the. F. Cundall, 395*
- Carleton, Prof. M. A. Future Wheat supply of the U. S., 151*
- Carnegie Institution of Washington, Year Book for 1910, 553*
- Carney, F. Abandoned Shore Lines of the Oberlin Quadrangle, 394*; Geographic Influences in Development of Ohio, 867*; Raised Beaches of Berea, Cleveland and Euclid Sheets, Ohio, 394*
- Carnier, C. Reisen in Matto Grosso und Paraguay, 869*
- Caroline Islands. Recent Bibliography, 510*; Peopling of Yap. W. Churchill, 510
- Caron, l'abbé Iv. Colonisation du Témiscamingue, 152*
- Carpathian Mountains: Sur la position systématique de la chaîne des Karpates. E. de Martonne, 71*
- Carruthers, D. Explorations in N. W. Mongolia, 396*
- Carthage and Tunis, old and new gates of the Orient. D. Sladen, 319*
- Carthaus, Dr. E. Insel Timor, 396*
- Cartography. See also Maps: ¶ Aviation Cartography, 779; August Petermann: Ein Beitrag zur Geschichte der geographischen Entdeckungen und der Kartographie im 19. Jahrhundert. Dr. E. Weller, *rev.*, 845; Bergzeichnung auf den älteren Karten. J. Röger, 480*; Aus der Geschichte der Kartographie. W. Wolkenhauer, 399*; Contribuições recentes para a cartographia do Brazil. O. A. Derby, 152*; Fortschritte der deutschen Kolonial-Kartographie in den Jahren 1905-10. P. Sprigade and Moisel, 316*; Gegen-azimutale winkeltreue Projektion. Dr. H. Mauer, *n.*, 552; Isogonenkarte in besonderer Projektion. Dr. H. Maurer, 799*; Kartenprojektion. Ein geogr.-kartogr. Kapitel aus . . . Kartenwissenschaft. M. Eckert, 317*; Kartographie in der Türkei. A. D. v. Diest, 227*; Maps of Primitive Peoples. B. F. Adler, 316*; Resumé in English, 669; Kuhnert physikalische Erdkarte in Mercators Projektion mit Darstellung der Meeresströmungen. Dr. G. Leipoldt, *n.*, 235*; Kunst in der Kartographie. Prof. F. Becker, 73*, 399*; Neue Anforderungen an das Landesvermessungswesen und an Topographie und Kartographie. F. Becker, 399*; Réfection en Fac-similé des anciens monuments de Géographie . . . son utilité pour la création de Musées cartographiques. C. Perron, 73*; Schweizer Schul-Kartographie. Dr. R. Hotz-Linder, 371*; Tables for Projection of Graticules for Maps on the scale of 1:1,000,000, *n.*, 220; De l'utilité d'une association cartographique internationale. Gen. J. de Schokalsky, 73*
- Casablanca, 155*; Monographie de la Chaouia. Lieut. Sagonds, 476*; Journal du corps de débarquement de — à travers la Chaouia (1907-8). Capt. Grasset, 869* ¶ Map of Casablanca; Region de, *n.*, 391
- Casey, T. L. Subsidence of Atlantic Shoreline, 953*
- Casson, H. N. History of the Telephone, *n.*, 308
- Casson, J. C. Agricultural Labour Conditions . . . Nyasaland, 556*
- Castagné, M. J. Question kirghize et la Colonisation des Steppes, 477*
- Castro, L. de. Criminali, Giudici e tribunali etiopici, 636*
- Catalogues. See also Bibliographies: American Catalog [ue], 1908-10, 800*; Catálogo de los Manuscritos a los Antiguos Jesuitas de Chile, 640*; Catálogo del Archivo de la Real Audencia de Santiago, 720; Catalogue of Fresh-Water Fishes of Africa

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- Catalonia: Groupement des populations dans la Catalogne septentrionale. M. Sorre, 639*
- Catellani, E. Ferrovie della Mancuria e l'Accordo Russo-Giapponese, 224*
- Cator, D. Map of Part of Nassarawa Province, N. Nigeria, 155*, Map, 78*
- Caucasus: Zur Lage der Schneegrenze im Kaukasus. A. v. Reinhard, 871*
- Cave Dwellers of the Old and New Worlds. J. W. Fewkes, 399*
- Caves: Barrancos et Cuevas. (Haut-Aragon). L. Briet, 719*; Caves and Ruins of Arizona and Colorado. C. Hallock, 394*
- Cebu Harbor, Chart U. S. Coast and Geod. Surv., 158*
- Celebes: ¶ Bevatende eenige gegevens betreffende het landschap Mamoedjoe, 870*; Celebes en Halmahera. E. C. Abendanon, 224*; Expedition der Kgl. Niederländ. Geogr. Gesellschaft nach Zentralcelebes 1909-10. E. C. Abendanon, 792* ¶ Maps of Celebes: Reizen door Centraal-Celebes. E. C. Abendanon and W. Schiebel, 549*; Zentral-Celebes. Reisen der Exp. der kgl. Niederländ. Geog. Gesell. E. C. Abendanon, 549*
- Central America. See under America.
- Central Asia. See under Asia.
- Cereals: Getreidebau im deutschen und römischen Altertum. R. Gradmann, n., 148
- Ceylon. A. Clark, n., 305; —, Malay States and Java Compared as Plantation and Residential Colonies. J. Ferguson, 638*; The Veddas. C. G. and B. Z. Seligmann, *rev.*, 930 ¶ Maps of: Map of Ceylon, 877*; Map illustrating The Veddas, 956*
- Chad Lake: ¶ French Mission to Capt. J. Tilho, 223* ¶ Maps of Chad Lake: Lac Tchad (Mission Tilho), n., 231; Sketch of route across. P. A. Talbot, 877*; Tschadsee in Gegenwart und Vergangenheit. A. Bencke, 877*
- Chad Lake Region: ¶ Documents scientifiques de la Mission Tilho (1906-09), n., 303; O. MacLeod and P. A. Talbot Explorations in, 526; Mise en valeur du Territoire du Tchad. Lieut.-Col. H. Mill, 223*
- Chailley, J. L'Inde Britannique, *rev.*, 207
- Chalmers, G. Caledonia; or, A Historical and Topographical Account of North Britain, . . . Dictionary of Places, 320*
- Chamberlain, A. Present Forest Problems of Massachusetts, 948*
- Chamberlain, J. F. Climate as related to Industry and Commerce, 317*; Geographic Influences in the Development of California, 788* — and A. H. Chamberlain. North America. A Supplementary Geography, n., 939
- Chamberlin, R. V. Ethno-Botany of the Gosiute Indians, 788*, 867*
- Chamberlin, T. C. and R. T. Certain Phases of Glacial Erosion, 720*
- Chambers, G. F. Halley's Comet, 318*
- Chambers, Capt. I. W. Aviation and Aeroplanes, 635*
- Chamonix, Itinéraire de la Vallée de —, d'une Partie du Bas-Vaillais et des Montagnes avoisinantes. [J. P. Berthout van Berchem], 320*
- Champlin, J. D. The Discoverer of the Philippines, 587
- Chandler, C. L. Argentine Meteorological Station in South Orkney Islands, 152*
- Chaoüia. Journal du corps de débarquement de Casablanca à travers la — 1907-8. Capt. Grasset, 869*; Monographie de la. Lieut. Sagonds, 476*
- Chapman, R. H. Triangulation and Spirit Levelling of Vancouver Island, 554*; United States Geological Survey, 553*
- Charcot, Dr. J. B. Expédition antarctique française 1908-10, 559*; The Second French Antarctic Expedition, 639*; Le Pourquoi Pas? dans l'Antarctique (1908-10), 719*; The Voyage of the "Why Not" in the Antarctic. English version by P. Walsh, *rev.*, 865; Charcot's Antarctic Explorations. E. S. Balch, 81; Exploring Ship presented to Dep. of Pub. Instruction, 60; Personal, 372
- Charente, Les origines de la vallée de la —. Ch. Passerat, 871* ¶ Maps of the Charente: Les différentes cycles d'érosion dans la région de la —; Carte tectonique de la région, n., 710
- Charleston Harbor. Chart U. S. Coast and Geod. Surv., 157*
- Charlotte Harbor, Florida, Main Entrance to —, Chart U. S. Coast and Geod. Survey, 545*

- Charpentier, J. de. *Essai sur les Glaciers et sur le terrain erratique du bassin du Rhône*, 238*
- Charriaut, H. *La Belgique moderne*, n., 933
- Charts: ¶ *Atlas of Portolan Charts*. Edited by Dr. E. L. Stevenson, 530; *Charts of the Chief Hydrographic Office, Russia*, 798, 799; *Charts showing Position and kind of Lights on the Coast and Rivers of China*, 549*; *General Catalogue of Mariners' Charts and Books*, 314*; *Portolani italiani del Medioevo*. Secondo l'opera di K. Kretschmer. C. Errera, 953*; *Skeleton of Plotting Charts*. Lieut. R. Stone, 635* ¶ *U. S. Hydrographic Office Charts*, 76, 158, 229, 309, 389, 470, 545, 632* ¶ *U. S. Coast and Geod. Survey Charts*, 76, 157, 309, 470, 545, 631, 875* ¶ *U. S. Weather Bureau Charts*, 158, 229, 309, 389, 546, 632, 706, 795*
- Chase, J. S. *Yosemite Trails*, 923
- Châtelet, La Scava; or, *Some Account of an Excavation of a Roman Town on the Hill of —*, etc. [Stephen Weston], 239*
- Chattanooga Campaign, With especial reference to Wisconsin's participation therein. M. H. Fitch, 880*
- Chauvenet, R. *Tin Deposits of El Paso Co., Texas*, 553*
- Chauvigné, A. *Topographie gallo-romaine de la Touraine*, 718*
- Checchi, M. *Asmara*, 223*
- Chekiang: Northeastern Chehkiang, China: Notes on Human Adaptation to Environment. T. Goodchild, 801
- Cheltenham, Md. *Results of Magn. Observations made at the Coast and Geod. Surv. Observ. at —*, 1907-8. D. L. Hazard, 635*
- Chengtou: Cité chinoise de Tchentou, ville principale du Se-Tchouan. H. Asselin, 792*
- Chesapeake Bay Entrance, Chart U. S. Coast and Geod. Surv., 157*
- Chevalier, A. *Navigation on Upper Niger*, 288; *La Mission —*. [French West Africa], 154*; see also J. Thoulet, *joint author*.
- Cheyenne, Great Mysteries of the. G. B. Grinnell, 553*
- Chichen-Itza, Trip to, 868*
- Chile: ¶ *Anuario de la Prensa Chilena*. Public. por la Biblioteca Nat. 1899, 640*; *Bituminous Coal of*, 636*; *Catálogo del Archivo de la Real Audiencia de Santiago*, 720*; *Catálogo de los Manuscritos a los Antiguos Jesuitas de*, 640*; *Chile of To-day. Its Commerce, its Production and Its Resources*. A. Ortúzar, 319*; *Von der chilenischen Längsbahn*. Dr. H. Polakowsky, 153*; *Nitrate Resources of*, 197; *Il primo congresso degli Italiani nel Cile*. E. Vellani, 790* ¶ *Maps of Chile: Demarcación de Límites con Chile. Region de la Puna*. Z. Sánchez and T. Loos, 955*; *Mapa de Chile*, 391*; *Region Salitrera de — comprendida entre El Toco i Copiapó*. J. J. Heuissler, n., 797; *Relief Model showing Effects of Valparaíso Earthquake*. G. C. Curtis, 525; *Republica de Chile*. L. Riso Patron, n., 159; *Trabajos jeodésicos chilenos*, n., 78
- China: ¶ *Descriptive: Among the Sons of Han. Notes . . . Residence . . . China and Formosa*. Mrs. T. F. Hughes, 237*; *China: Its Costume, Arts, Manufactures, etc.* Breton [de la Martinière, J.-B.], 236*; *China under the Empress Dowager. Being the History of Life and Times of Tzu Hsi*. J. O. P. Bland and D. Backhouse, *rev.*, 460; *En Chine*. G. Donnet, 400*; *Cook's Handbook for Tourists to Peking, Tientsin, Shan-Hai-Kwan, Mukden, Dalny, Port Arthur and Seoul*, n., 376; *Explorations dans la Chine occidentale*. A. Legendre, 717*; *Über de geologische Entwicklung Chinas*. Prof. F. Frech, 156*; *Journal of Three Voyages along the Coast of*. C. Gutzlaff, 237*; *Kientchang et Lolotie*. Chinois-Lolos-Sifans. Dr. A. F. Legendre, n., 376, 717*; *Land of the Great Wall*. Lecture by W. E. Geil, 132; *Provinces of China*, *rev.*, 782; *Dans les rapides du Yalong*. Mgr. de Guébriant, 70*; *Sketches of Chinese Customs & Manners in 1811-12*, etc. G. Wilkinson, 237*; *Travels . . . with a Narrative of Residence in China*. P. Dobel, 236*; *Vandalism in China*. F. McCormick, 56; *Wanderings in*. C. F. G. Cumming, 236* ¶ *La Femme chinoise*, 156*; *Letters from . . . Particular Reference . . . Women of China*. S. P. Conger, *rev.*, 698 ¶ *Chemins de fer chinois*. E. de Laboulaye, 637*; *Emprunt pour les chemins de fer Hankéou-Canton et Hankéou-Seu-Tchouan*, 951* ¶ *Economic and Commercial: Abstract of Statistics. Returns of Trade and Trade Reports*, 1909, 70*; *S. Coast Ports*, 1910, 396*, *Analysis of foreign trade* 1909, Imports, 477*; *Foreign Trade of —* 1910, 951* *Frontier Ports. Returns of Trade*, 1909, 396*;

- China and Its Resources, Peculiarities, etc. . Opium Question and Notice of Assam. R. Mudie, 237*; Das chinesische Fischerwesen. L. Katscher, 156*; Famine in, 137; Question de l'opium. Un nouvel accord anglo-chinois, 951*; Réforme monétaire en Chine, 156*; Report on the Working of the Imperial Post Office, 1909, 156*; Teeausfuhr, 224* ¶ Islam in. A Neglected Problem. M. Broomhall, *rev.*, 782; Religion und Kultur der Chinesen. W. Grube, *rev.*, 931; Valore morale del popolo cinese. Prof. G. Vacca, 717* ¶ Monumenti Sinici, quod Anno Domini MDCXXV terris in ipsâ Chinâ erutum; etc. Andreas Müllerus, 237* ¶ Russie et la Chine, 637* ¶ Maps of China: Distribution of Iron Ores in, 877*; Chinese portion of railroad from Hanoi to Yunnan Fu, 550*; Hoebel's Karte v. China, *n.*, 232; Itinéraire du Capitaine Harfeld dans le Hou Nann et le Kiang Si, 708*; Map — prepared for China Inland Mission, 550; Portions of Chinese Turkestan and Kansu, Kun-lun Range, etc., *n.*, 392; Sketch Map of — and Manchuria to illustrate R.R. in North China and trade routes converging upon Tientsin, 877*; Nine Charts showing Position and Kind of Lights on the Coast and Rivers of, *n.*, 549; Postal Map of, 160; Sketch Plan of Coast Line with Canton and West River deltas, etc., 160*; Sketch Map showing position of Lake Shanghai, 709*; W. Yenchi District, 877*
- Chinese Turkestan. See under Turkestan.
- Chippewa Music. F. Densmore, 474*
- Chiriqui, Cattle Raising in —. F. Lindsay, 636*
- Chitina District, Alaska, Mining in. F. H. Moffit, 394*
- Choctawhatchee R. Drainage Basin, 475*
- Chodat, Dr. R. and Dr. E. Hassler. Aperçu de la géographie botanique du Paraguay, 67*
- Choffat, P. Présentation d'une carte hypsométrique du Portugal, 71*
- Cholnoky, Dr. J. de. Irrigation dans l'Asie centrale et la migration des peuples, 870*
- Choquequirau, Ruins of —. H. Bingham, 476*, 720*
- Christian, F. W. Eastern Pacific Lands: Tahiti and the Marquesas Islands, *rev.*, 380
- Christiansen, K. Ch. Künstliche Bewässerung Babylonien, 155*
- Chronicles. Historische Kronyck, Grootlycks Vermeerderd en Verbeeterd. Te Leyden MDCCII. J. L. Gottfried, 720*
- Chumash and Costanoan Languages. A. L. Kroeber, 221*
- Churchill, W. Peopling of Yap, 510; Polynesian Wanderings, *rev.*, 265
- Cincinnati, Geographic Influences affecting Early —. N. M. Fenneman, 714*
- Cirque du Creux Noir (Vanoise), Dessin-modèle du rocher en haute montagne, *n.*, 960
- Cities: ¶ Über Aufgaben der Städtekunde. Dr. H. Hassinger, 316*; Fribourg et son site géographique. Étude de géographie urbaine. Prof. P. Girardin, 559*; Rôle des conditions topographiques dans le développement des villes suisses. P. Girardin, 871*; Terraindarstellung auf Stadtplanen. Prof. E. Oberhummer, 74*; Urbanisme. Étude historique, géographique et économique. P. Clerget, 559*; Wind Velocity and Hygiene in Large Cities, 292 ¶ Maps of Cities: Geographische Verbreitung der Grossstädte. Dr. H. Hassinger, *n.*, 552; Liste alphabétique des plans et vues de Villes, Citadelles et Forteresses qui se trouvent dans le grand Atlas de Mortier. Édition de Amsterdam, 1696. Sir Herbert G. Fordham, 640*
- Claparède, A. de. Oasis des Zibans, 315*; Editor *Compte Rendu des Travaux du Congrès*, Neuvi. Congrès Intern. de Géog., Vol. 2, 74*
- Clapp, C. H. Geology of Victoria and Saanich Quadrangles, B. C., 948*
- Clapp, E. J. Rhine and Mississippi R. Terminals, 714*
- Clapp, F. G. Occurrence and Composition of Well Waters in the Slates of Maine, 553*; — in Granites of New England, 635*
- Clark, A. Ceylon, *n.*, 305
- Clark, A. H. Clipper Ship Era, *rev.*, 542
- Clark, G. Yosemite Valley, *rev.*, 61
- Clark, G. R., Sketch of his Campaign in Illinois in 1778-9, 400*
- Clark, R. C. Beginnings of Texas, 1684-1718, 474*
- Clarke, Lieut.-Gen. the Hon. Sir Andrew, Life of —. Col. R. H. Vetch, *editor*, 320*
- Clarke, Dr. J. M., Personal, 529
- Clarke, S., *joint author*, see E. Naville.
- Clavery, E. L'Inde. Sa condition actuelle, *rev.*, 207

- Clavus, Claudius — and the Early Geography of the North. E. Hea-wood, 228*
- Cleland, H. F. North American Natural Bridges, etc., 474*
- Clément-Simon, F. A propos du Pérou, 153*
- Clerget, P. Géographie des textiles, 479*; La navigation actuelle du Rhône, ses améliorations possible, etc., 793*; Production et consommation du cacao, 479*; Urbanisme. Étude historique, géographique et économique, 559*
- Cleveland, F. A., and F. W. Powell. Railroad Promotion and Capitalization in the U. S., *n.*, 218
- Cleveland Normal School, Geographical Equipment of the. W. M. Gregory, 453
- Climate. See also Meteorology: ¶Aeronautics and Climate, 624; Climate as Related to Industry and Commerce. J. F. Chamberlain, 317*; Climates of the Geological Past. H. J. Jensen, 317*; Cyclonic Unit in Climatology. W. G. Reed, Jr., 372; Einfluss der klimatischen Faktoren auf die Vegetation im allgemeinen und speziell auf die Höhe des Pflanzenertrages. Dr. F. Vageler, 872*; Einfluss des Waldes auf das Klima. Dr. W. R. Eckardt, 73*; Handbuch der Klimatologie. Klima der Gemässigten Zonen und der Polarzonen. J. Hann, *rev.*, 935; Wind und Wetter. Prof. Dr. L. Weber, *rev.*, 787
- Climbs. See Mountaineering.
- Clipper Ship Era, Epitome of Famous American and British Clipper Ships ... 1843-1869. A. H. Clark, *rev.*, 542
- Close, Col. C. F. Purpose and Position of Geography, 740
- Clouds: Levels of Maximum and Minimum Cloudiness. W. J. Humphreys, 953*
- Clouzot, E. Inondations à Paris du VI^e au XX^e siècle, 638*
- Coal: Formation of Coal Beds. J. J. Stevenson, 640*; Natural History of. E. A. N. Arber, *n.*, 937
- Coast and Geodetic Survey of the U. S.: Results of Magnetic Observations made by — 1909-10. R. L. Faris, 635*; for Charts of the —, see under Charts.
- Coastal Plain: ¶Early Aspects of Vegetation of South Carolina, Georgia and N. E. Florida. R. M. Harper, 948*; Quantitative Study of the more Conspicuous Vegetation of Cert in Natural Subdivisions of —, R. M. Harper, 553*; Saline Artesian Waters of the Atlantic Coastal Plain. S. Sanford, 553*
- Coast Ranges of California, Extension of the Known Area of Pleistocene Glaciation to the —. R. S. Holway, 161
- Coasts: ¶Genesis and Development of Sand Formations on Marine Coasts. P. Olsson-Seffer, 953*; Raised Beaches and Head of Cornish Coast. W. Rogers, 316*; Über Stranddünen und ihre Befestigung. W. Stavenhagen, 872*
- Cobb, Prof. C. Physical Geography. Purpose of the, Course — Training for Service, 479*
- Coblentz District: Kulturgeographische Wanderungen im Koblenzer Verkehrsgebiet. Dr. R. Martiny, *n.*, 785 ¶Map: Koblenz um 1900, *n.*, 878*
- Cochin China. See also Indo-China, French: Plantations de caoutchouc en Cochinchine, 637* ¶Map: Carte physique, *n.*, 956
- Cochrane, Hon. F. Conservation of Natural Resources of Ontario, 475*
- Coe, W. R. Nemerteans. (Harriman Alaska Series), 480*
- Colby, F. M., *Editor*. New International Year Book ... 1910, 560*
- Coleman, Prof. A. P. Climate and Physical Conditions of Keewatin, 394*; History of the "Canadian Shield," 66*
- Col du Pelvoux. H. Mettrier, 71*
- Coldstream, W. (*Editor*). Records of Intelligence Dep. of the Government. N. W. Provinces of India during Mutiny of 1857, 236*
- Collier, A. J., *Personal*, 196
- Collier, P. The West in the East from an American Point of View, *rev.*, 932
- Collins, G. N., and C. B. Doyle. Notes on Southern Mexico, 635*
- Collins, W. H. Montreal R. District, 948*
- Colombia, Maps of: Forschungsreise des Dr. Hamilton Rice im Flussgebiet des Rio Caiary-Uaupés, 707*; Peninsula de la Guagira. F. A. A. Simons, 955*
- Colon Harbor, Charts U. S. Coast and Geod. Surv., 158*, 635*
- Colonial Geography: See under Geography.
- Colorado: ¶Coal Fields of Canon City, and South Park. C. W. Washburne, 152*; Investigations of Coal Fields in — and New Mexico in 1909. G. C. Martin, C. W. Washburne and

- Others, 151*; of Northwestern — and N. E. Utah. H. S. Gale, 313*; Trinidad coal-fields. G. B. Richardson, 151* ¶Caves and Ruins of Arizona and —. C. Hallock, 394*; Florence Oil Field. C. W. Washburne, 152*; On the Use, Non-Use and Waste of Mineral Resources of F. Guiterman, 221* ¶Maps of Colorado: Life Zones of, *n.*, 795; Distribution of certain animals, mainly rodents, 795*; Distribution of certain trees or plants, 795* ¶U. S. G. S. Maps: Boulder, Danforth Hills, Eaton, Grand Hogback, Rangely, and White River Quadrangles, 75*; Breckenridge Special Map, 75*; Distribution of principal silver, lead and gold regions of, 953*; Geol. Map of Breckenridge District, 954*; Jensen Quad., 76*; Leadville Special Map, 308*; Map showing areas of gypsum in Eagle Co., 874*; Outline Map of Region adjacent to Breckenridge, 954*; Reconnaissance Geologic and Topographic Maps of Part of Danforth Hills Quad., etc., 157*; — of Parts of Grand Hogback, Jensen, Rangely, and White R. Quadrangles, 157*; Topography and Mining Claims of Breckenridge District, 954*; Uncompahgre Quad., *n.*, 544
- Colorado River Basin: ¶History of Grand Canyon District. Prof. D. W. Johnson, 285; Single Cycle Development of Grand Canyon of the. H. H. Robinson, 948*
- Colorado Springs Coal Field. M. I. Goldman, 151*
- Colquhoun, A. R. Rhodesia, 68*
- Colton, W. Three Years in California, 236*
- Columbia, District of: See District of Columbia.
- Columbus, Christopher: Ancienne et nouvelle campagne pour la canonisation de Christophe-Colomb. H. Vignaud, 74*
- Comets: Halley's Comet. G. F. Chambers, 318*; — and the Earth's Atmosphere, 640*; Did the Tail of Halley's Comet affect the Earth's Atmosphere? Dr. J. Aitken, 228*; Return of Halley's Comet. W. W. Campbell, 479*
- Comino, Val di — o Cominese. Prof. R. Almagià, 639*
- Commerce: ¶Climate as related to Industry and —. J. F. Chamberlain, 317*; Commerce of the World in 1910, 860; Commerce de l'ancienne Égypte avec les nations voisines. Prof. E. Naville, 869*; Dangers of Municipal Trading. R. P. Porter, *n.*, 943; Trade Routes, Past and Present — East and West. R. Kalisch, 399*
- Commercial Geography. See under Geography.
- Communications: See Transportation.
- Comoro Islands: Statistiques du Commerce des Colonies françaises pour 1908. Mayotte et Comores, 636*
- Condra, G. E. Geographic Influences in the Development of Nebraska, 221*
- Confuso, Rio. Carte de la région des marais du Rio Pilcomayo et du —. A. Schmied et Arnold, 67*
- Congdon, F. T. Fur-Bearing Animals in Canada and How to Prevent their Extinction, 475*
- Conger, S. P. Letters from China, *n.*, 698
- Congo: The Medicine-Man and His Black and White Magic. J. H. Weeks, 555*
- Belgian Congo: ¶Les Bakango. Lieut. A. Hutereau, 314*; Les Bangala. Sociologie descriptive. Cyr. van Overbergh et Ed. de Jonghe, *rev.*, 303; Chemins de fer nationaux vers le Katanga. L. Goffin, 153*; Commerce dans le bassin du Kasai, 68*; Le commerce au Katanga. G. de Leener, 869*; Congo Belge en 1910, 223*; Congo Belge. C. Martin, 223*; Le Congo au Parlement. Cessions minières au Katanga, 314*; Documents ethnographiques congolais: Manyanga, Mafoto. A. Hutereau, 68*; Étude sur les Kuku. J. Vanden Plas, 476*; Freight Automobiles in, 136; Le Général Sanford. Reconnaissance de l'Association du Congo. A. J. Wauters, 791*; Gites métallifères du. C. V. Brien, 790*; In the Heart of Africa. [Congo Exp. Amer. Mus.] M. C. Dickerson, 68*; Les huilleries du, 869*; Heutige Katanga. E. Zimmermann, 68*; Immigration au Katanga, 153*; Le Katanga, 68*; Vom Kongo zum Ubangi. F. Thonner, *rev.*, 64; Le "Livres gris" sur la question des chemins de fer du Congo, 791*; Du Lualaba au Moero. E. Slosse, 950*; Matadi-Leopoldville R.R., 620*; Mines de cuivre du Katanga. E. Zimmermann, 153*; Mining Conditions in. S. H. Ball and M. K. Shaler, 153*; Mission an den Staatposten von. P. L. Massma, 153*; Nos missionnaires au. E. Tibbaut, 68*; Navigabilité du Kasai-Sankuru, 716*, 791; Navigation sur le Congo de Léopoldville à Stanley-

- ville, 791*; La numération chez les Peuplades du Lac Leopold II. M. J. Maes, 223*; Pêche et Poissons au Congo Belge. Capt. Wilverth, 716*; La "Pipe Line" du Congo, 716*; Plantations d'État au —, 395*; Present Situation in. Rev. W. L. Ferguson, 716*; Prospects of Rubber Plantations in the Kasai District, 869*; Reserves diamantifères du Katanga, 950*; Vers la suppression complète de l'esclavage au. Lieut.-Gen. Donny, 869*; Le Transcongolais. Navigabilité du bief Kongolo-Bukama, 791*; Vallée de la Lukuga et le chemin de fer du Tanganika. A. Delcommune, 790*; Véritable signification du Katanga pour la Belgique. P. Fort-homme, 950* ¶ Maps of Belgian Congo: Carte du Bas-Congo. H. Droogmans, 471*; Carte du District du Katanga. H. Droogmans, *n.*, 471; Chart of River Aruwimi. R. L. Reid, 797*; Duke of Mecklenburg Expedition's field Work. Lieut. M. Weiss, *n.*, 956; Franz Thonner's Aufnahmen zwischen dem Kongo und dem Ubangi, *n.*, 159; Mining Localities and Approximate Geol. Boundaries in, *n.*, 471; Railroads and Mining Concessions, *n.*, 471; Neue Grenze zwischen Belgisch-Kongo u. Deutsch Ost-Afrika, 547*; Sprachenkarte des Gebietes zwischen Kongo und Ubangi. Übersichtskarte des —. F. R. Thonner, *n.*, 159; Voies d'accées vers le Katanga, *n.*, 78
- French Congo: See French Equatorial Africa.
- Congo River: ¶ Navigation sur le Congo et le Stanley Pool. C. Martin, 716*; Navigation sur le — de Léopoldville à Stanleville, 791*
- Congresses: ¶ Compte Rendu des Travaux du Congrès. Neuv. Congrès Intern. de Géog., 1908. A. de Claparède, *editor*, 74*, 871*; Exkursion des XI. Intern. Geol.-Kongresses nach Spitzbergen. Dr. F. Wahnschaffe, 479*; —. Prof. R. S. Tarr, 31; Geological Congress at Stockholm, 227*; French Geographical Congress, 203; Il VII Congresso Geog. Italiano, 478*; Tenth International Geographical Congress postponed, 922; Le XVI^e Congrès International des Américanistes. Dr. Capitan, 228*
- Connecticut: ¶ Connecticut by Daylight. T. McQuill, 400*; Geological and Natural History Survey of. Prof. W. N. Rice, 521 ¶ Maps of Connecticut: Prel. Geol. Map of —. H. E. Gregory and H. H. Robinson, 954*; Charts U. S. Coast and Geod. Surv.: Fishers Is. Sound, 875*; North Shore of Long Island Sound, 76*
- Connecticut R. Chart: Entrance to Deep R., 875*
- Conversation, Travellers' Practical Manual of —, in English, French, German and Italian, *n.*, 149
- Conybeare, E. Early Britain. Roman Britain, *n.*, 701
- Cook's Handbook for Tourists to Peking, Tientsin, Shan-Hai-Kwan, Mukden, Dalny, Port Arthur and Seoul, *n.*, 376
- Cook, O. F. History of Coconut Palm in America, 394*
- Cook, S. A. Glossary of the Aramaic Inscriptions, 320*
- Cook, W. A. Through Wildernesses of Brazil, *rev.*, 302
- Cooke, W. W. Distribution and Migration of North Amer. Shore-birds, 66*; Our Greatest Travelers. Birds that fly from Pole to Pole, 788*
- Cooper, J. A. Recent Developments in West Africa, 69*
- Copan, the Mother City of the Mayas, S. G. Morley, 789*
- Copley, J. Kansas and the Country beyond . . from Missouri to Pacific Ocean, *etc.*, 318*
- Coquille, D. W., *joint author*, see Wm. Ashmead.
- Cora, Prof. G. Notizie sulla Repubblica di Liberia. Specialmente Secondo i Viaggi e gli Studi di J. Büttikofer, 637*; Da Trento al Brennero, 719*; — *Cosmos*, 370
- Coral and Atolls. Their History, Description, . . . Influence of Winds, Tides . . . on Their Formation, *etc.* F. Wood-Jones, *rev.*, 944
- Coral Reef, Pleistocene Glaciation and — Problem. R. A. Daly, 399*
- Cordillera. See also Andes: Beiträge zur Kenntnis der Argentinischen —. F. Kühn, 555*; *rev.*, 847; Patagonischen Anden zwischen dem 42. u. 44. Grade s. Breite. Dr. P. Krüger, 949*; Vorkordillere zwischen Flüssen Mendoza u. Jachal in Argentinien. Dr. R. Stappenbeck, 950*
- Córdoba, G. L. F. Wirtschaftliche Erschliessung Patagoniens, 869*
- Corea. See Korea.
- Cornish Coast, Raised Beaches and Head of. W. Rogers, 316*
- Cornish, Dr. V. Panama Canal, 395*; — and Its Makers, *rev.*, 62
- Cornwall: ¶ Grundzüge der Oberflächengestaltung Cornwalls. H. Speth-

- mann, 851; Via — to Egypt. C. F. Gordon-Cumming, 400*
- Coromandel Coast, Narrative of Military Operations on the —, against the combined forces of the French, Dutch and Hyder Ally Cawn, from 1780 to the Peace in 1784. I. Munro, 480*
- Correa Morales, E. G. A. de. República Argentina, 868*; Unterricht der Geographie in Argentinien, usw., 868*
- Corsica: ¶Anciens glaciers de la Corse et les oscillations pleistocènes de la Méditerranée. R. Lucerna, 560*; Eiszeit auf Korsika und das Verhalten der Exogenen Naturkräfte seit dem Ende der Diluvialzeit. Dr. R. Lucerna, 315*; Insel Korsika. F. Mielert, 315*; Vorläufiger Bericht über eine Studienreise nach. Dr. E. Scheu, 397* ¶Map of Corsica: Eiszeit-Karte von, 234*
- Cortier, Capt. M. Itinéraire dans l'Adrar (Map), 79*
- Coryndon, R. T. Agricultural Labour Conditions in Swaziland, 555*
- Cosmographie Introductio. Waldseemüller, Saint-Dié's Celebration of the Printing of —, 290
- Cosmos: Sketch of Physical Description of the Universe. A. von Humboldt, 320*
- Cosmos, Prof. G. Cora's, 370
- Costa Rica: ¶Anuario Estadístico, 1909, 475*; Contribution à l'étude de l'acclimatement du Bétail européen au. F. Peralta, 554*
- Coulson, C. J. D. Korea, n., 377
- Coutlee, C. R. Water Wealth of Canada with Special Reference to Ottawa R. Basin, 475*
- Covert, C. C., A. H. Horton and R. H. Bolster. St. Lawrence R. Basin, 1909, 635*
- Cowles, Dr. H. C., Personal, 692
- Cox, A. J. Philippine Firewood, 951*
- Cox, G. H. Elizabeth Sheet of Lead and Zinc District of N. Illinois, 553*
- Cox, H. J. Frost and Temperature Conditions in Cranberry Marshes of Wisconsin, 635*; Relation of Climate to Cranberry Growing, 196
- Craig, J. I. Notes on Temperature at Alexandria, 636*
- Cranberry, Relation of Climate to — Growing. H. J. Cox, 196
- Crawford, A. Our Troubles in Poona and Deccan, 319*
- Crider, A. F. Cement and Portland Cement Materials of Mississippi, 880*
- Crimea: Geographische Charakterbilder aus der Krim. Dr. G. Fester, 952*
- Croatia, Map: Geol. Map of the Spa of Stubicke Toplice, 473*
- Crommelin, A. C. D. Address on Return of Halley's Comet in 1910, 399*
- Crooke, W. Anthropology, 72*
- Cross, A. L. Visit to Lapland, 398*
- Crowfoot, J. W. Some Red Sea Ports in Anglo-Egyptian Sudan, 716*
- Cuba: ¶Cuba. I. A. Wright, *rev.*, 533; Nipe Bay Country. I. A. Wright, 949*; Zuckerrohrkultur und Zuckerindustrie auf Cuba. R. J. Holty-Camagüey, 67*
- Cufino, L. Confine occidentale della Tripolitania e le Oasi del Kauar, 69*; Depressioni ad Oriente del Ciad. Eguei ed il Toro, 69*; Occupazione dell' Uadai, 68*
- Cullum Geographical Medal, awarded to Prof. Dr. Hermann Wagner, 52, 283
- Culture of the Nations. M. Jefferson, 241
- Cumming, C. F. G. From Hebrides to the Himalayas. Wanderings in Western Isles and Eastern Highlands, 320*; Wanderings in China, 236*
- Cundall, F. Colonization of the Caribbean, 395*
- Cunningham, A., Plan showing —'s Route and Site of First Discovery of Gold in Australia, 957*
- Cunningham, W. M. Agricultural Labour and Other Conditions of Bahamas, 554*
- Curaçao, Topographische Opneming van het Eiland. J. V. D. Werbata, 152*
- Current Geographical Papers, 66, 151, 221, 313, 394, 474, 553, 635, 714, 788, 867, 947. For classified List see Geographical Papers, Current.
- Currier, Rev. C. W. Museum of La Plata, 636*
- Curtis, G. C. Land Reliefs that are True to Nature, 418; Relief Model showing Effects of Valparaiso Earthquake, 525
- Curzon of Kedleston, Right Hon. Lord George N. —'s Administration of India. Syed Sirdar Ali Khan, *rev.*, 783, Personal, 530
- Cushing, H. P., H. L. Fairchild, R. Ruedemann and C. H. Smyth, Jr. Geology of Thousand Islands Region, 222*
- Cushman, A. S. Conservation of Iron, 867*
- Cutter, V. M. Quirigua, 554*
- Cuvillier-Fleury, R. Le Bassin de l'Ombella, 791*
- Cuzco, Algunos materiales para la antropología del. A. Lorena, 715*

- Cvijić, J. Ancien lac Égéen, 872*; Carte du Lac Égéen; Les Lacs Égéen et Pannonien au Miocène, 710*; Pleistozäne Hebungen und Vergletscherung, 73*
- Cyclones, Sugar Cane and Insurance. (Sugar Industry of Mauritius). A. Walter, 918
- Cyclonic Unit in Climatology. W. G. Reed, Jr., 372
- Cyprien, R. P. Une nouvelle fondation aux pays Gallas (Abyssinie), 67*
- Cyzicus. Account of History and Antiquities of — . . . and District Adjacent to it, etc. F. W. Hasluck, n., 930
- Czekanowski, J. Beiträge zur Anthropologie von Zentral-Afrika, 68*
- D.
- Dahomey: Statistiques du Commerce, 1908, 636*; Togo-Dahomey Grenzvermessungs-Expedition, etc. A. v. Seefried, 870*
- Daireaux, G. Estancias in Argentina, 314*
- Dalai-Lama oder Taschi-Lama?, 70*
- Dalhousie, N. B., Sketch Map of —, showing relation of the eruptive mass . . . to the Devonian marine sediments, 796*
- Dall, Wm. H., Land and Fresh Water Mollusks, 480*; —, C. Keeler, *et al.* History, Geography, Resources (Harriman Alaska Series), 480*
- Dalla Vedova, G., C. Bertacchi, and Others. Riforme urgenti per la geografia nelle Università Italiane, 952*
- Daly Medal, Awarded to Dr. Grove K. Gilbert, 51
- Daly, R. A. Pleistocene Glaciation and Coral Reef Problem, 399*
- Damaraland, Kalkpfannen des östlichen —. Dr. H. Michaelsen, 154*; S. Passarge, 154*
- Damas, D. Oceanography of the Sea of Greenland, 479*
- Danès, Dr. J. V. Geomorpholog. Studien im Karstgebiete Jamaikas, 67*
- Danube: Commission européenne du —. Porumbaru, 226* ¶ Map of Danube: Les environs du confluent du — et de la Tisza. Carte morphologique, 957*
- Darbishire, B. V. English adaptation of Stieler's Atlas of Modern Geography, n., 235
- Dar-es-Salaam: ¶ Zur Geologie und Hydrologie von Daressalam und Tanga. W. Koert and F. Tornau, n., 927; Le Transafricain de Matadi à —. A. J. Wauters, 716* ¶ Maps of Dar-es-Salaam: Skizze von Daressalam mit den in den Jahren 1901-5 ausgeführten Bohrungen, 956*; Skizze von Tanga mit den 1902-3 ausgeführten Wasserbohrungen, 956*
- Darfur, Map: Frontière Ouadai-Darfur, 78*
- Darmstadt, Notizblatt des Vereins für Erdkunde und der Grossh. geol. Landesanstalt zu — für 1909, 227*
- Darton, N. H. Geological Work along the Santa Fé R.R., 195; Geol. Map of Part of N. W. New Mexico and N. Arizona, 157*
- Darwin, Maj. L. Suggestions for the Future Work of the Royal Geog. Soc., 779
- Darwin, Sir George. Tidal Observations of the British Antarctic Exp. 1907, 398*
- Dauphiné, Ascensions nouvelles dans le E. Santi, 793*; Études récentes sur les glaciers du. C. Jacob, 73*
- Davis, Capt. J. K., Description of Macquarie Island, 126; Voyage of the S. Y. "Nimrod," 228*
- Davis, M. K., *joint author*, see C. R. Dryer.
- Davis, R. A. Fruit Culture in Swaziland, 717*
- Davis, W. G. Climate of the Argentine Republic, 314*; *rev.*, 533
- Davis, W. M. Antarctic Geology and Polar Climates, 478*; Notes on the Description of Land Forms, 46, 190, 598, 679, 847; Rational Study of Topographic Forms, 361; Personal, 623, 692, 861
- Davison, C. Characteristics of British Earthquakes: Summary of Twenty-One Years' Work, 478*
- Day, D. T. Analyses of Crude Petroleum from Oklahoma and Kansas, 151*
- Day, P. C. Frost Data of the United States, 523
- Death Valley Region, 129
- Decazeville, Coal Basin of. J. J. Stevenson, 793*
- Deccan, Our Troubles in Poona and the —. A. Crawford, 319*
- Deeken, R. Der Handel Samoas, 226*
- Degel, Dr. H. Atlas, Lernbuch und Schöler, 399*
- Delafosse, M. Confréries musulmanes et le Maraboutisme dans les pays de Sénégal et du Niger, 716*
- Delaware: Results of Spirit Levelling in —, District Columbia, Md., and Va. R. B. Marshall, 66*; Archaeology of — Valley. E. Volk, 800*

- Delaware R., Penns Neck to Philadelphia, Chart U. S. Coast and Geod. Surv., 545
- Delcommune, A. La vallée de la Lukuga et le chemin de fer du Tanganika, 790*
- Delta Formation, Some Features of. C. R. Dryer, 228*
- Demanche, G. Tunisie, 155*
- Demangeon, A. Impressions d'Irlande, 872*
- Demers, l'abbé B. Paroisse de St. Romuald d'Etchemin, *n.*, 924
- Demontès, V. Algérie, 790*
- Deniker, J. Tremblement de terre de Vernyi, 637*
- Denis, P. Le Brésil au XX^e siècle, *rev.*, 626; translation, *rev.*, 924
- Denmark: ¶ Description of Topographic and other maps issued by the Top. Dep. of the Gen. Staff [in Danish], 558*; Population of, 1911, 689 ¶ Map of Denmark: Danmark i 35 Kort over Nordlesvig, *n.*, 713
- Dennett, R. E. Nigerian Studies; or, The Religious and Political System of the Yoruba, *rev.*, 460
- Dennis, J. S. Rev. Centennial Survey of Foreign Missions, 320*
- Densmore, F. Chippewa Music, 474*
- Denucé, J. Ressources économiques du Spitsberg, 398*
- Dénudation, Erosion, Corrosion, and Corrasion. J. W. Gregory, 399*; Écoulement fluvial et dénudation, d'après les travaux de l'U. S. Geol. Survey. H. Baulig, 560*
- Derby, O. A. Contribuições recentes para a cartographia do Brazil, 152*
- Deschamps, E. Impressions de Californie. Ascension du Tamalpais, 553*
- Descombes, P. Surcharge des pâturages et l'aménagement des montagnes, 72*
- Desert Ranges, Relations of Present Profiles and Geological Structures in. C. R. Keyes, 474*
- Desparmet, J. Œuvre de la France en Algérie jugée par les Indigènes, 869*
- Detchebarne, Lieut. Jonction du territoire de Zinder, 69*
- Detroit R., Map of: Lower — showing available Channel and Positions of Aids to Navigation, 875*
- Devins, J. B. Classic Mediterranean, *n.*, 540
- De Windt, H. Siberia as It Is, 236*
- Dew-Ponds, Further Experiments on. E. S. Martin, 317*
- Dexter, Hon. Edwin G. Education in Porto Rico, 636*
- D'Halluin, Dr. M. Photographie en Cerf-Volant, 872*
- Diaz del Castillo, Bernal. Historia Verdadera de la Conquista de la Nueva España por — uno de sus Conquistadores. La publica Genaro Garcia, 480*
- Dickerson, M. C. In the Heart of Africa [Congo Exp. Amer. Mus.], 68*
- Dickinson, P. L., joint author, see J. M. Hone.
- Dictionaries: ¶ Classical Dictionary . . . Greeks and Romans with account of coins, weights and measures, etc. C. Anthon, 320*; Concise Dictionary of Old Icelandic. G. T. Zoëga, *n.*, 213; Meyers Grosses Konversations-Lexikon. Sechste Aufgabe, 320*
- Diest, A. D. von. Kartographie in der Türkei, 227*; — des nordwestlichen Kleinasien, 870*
- Diétrich, Dr. B. Morphologie des Moselgebietes zwischen Trier und Alf, 478*
- Diguet, L. Histoire de la cochenille au Mexique, 554*
- Diller, J. S. Types, Modes of Occurrence, and Important Deposits of Asbestos in the U. S., 867*; —, C. Butts, and Others. Miscellaneous Nonmetallic Products, 867*; — and M. A. Pishel. Prel. Report on Coos Bay Coal Field, Ore., 867*; Map of Coos Bay Coal Field, Ore., 630*; Map of Northern Part and Map of Middle Part of Coos Bay Coal Field, 630*
- Dines, W. H. Registering Balloon Ascents, 1909, and 1910, 640*
- Dingelstedt, V. Ruling Nations: Considerations on Their Characters, 872*
- Dinkas, Les. Col. Largeau, 790*
- Dirr, Dr. A. Linguistische Probleme in Ethnol., anthrop. und geogr. Beleuchtung, 318*
- District of Columbia: Results of Spirit Levelling . . . 1896 to 1909. R. B. Marshall, 66
- Dix, A. Politische Wirtschaftsgeographie, 317*
- Dixon, R. B. Shasta Myths, 394*
- Dixon, W. G. Land of the Morning. Account of Japan and its People, 236*
- Dobel, P. Travels in Kamtchatka and Siberia, with Narrative of a Residence in China, 236*
- Dobrynin, B. Andalusian Cordillera. [In Russian], 316*
- Dodd, W. E. The Fight for the Northwest, 1860, 948*
- Doire Baltée en aval d'Aoste. Une Vallée tectonique. E. Argand, 478*

- Dominican Republic. See Santo Domingo.
- Domville-Fife, C. W. Great States of South America, Account of their Condition and Resources, etc., *rev.*, 459
- Donnet, G. En Chine, 400*
- Donny, Lieut.-Gen. Vers la suppression complète de l'esclavage au Congo Belge, 869*
- Douarche, E. Les facteurs essentiels de l'acclimatement du bétail européen au Tonkin, 315*
- Douglas Fir, Height and Dominance of. T. C. Frye, 221*
- Douglas, J. Conservation of Natural Resources, 474*
- Douglass, W. B. Sketch Map of Navaho National Monument, Ariz., 632*
- Doury, le Capitaine. Du Guir à la Mauritanie, 476*
- Dove, Prof. Dr. Medizinische Geographie, 794*
- Dowling, D. B. Coal Fields of Jasper Park and Edmonton, Alberta, 554*, 948*
- Doyle, C. B., *joint author*, see G. N. Collins.
- Dresser, J. A. Serpentine Belt of Southern Quebec, 948*
- Drews, Lieut. Erkundung der Hunsberg, 396*
- Dreypondt, Dr. G. Maladie du Sommeil, 228*
- Droogmans, H. Carte du Bas-Congo, 471*; Carte du District du Katanga, *n.*, 471
- Drushel, J. A. Studies in Glacial Geology in St. Louis and Vicinity, 867*
- Dryer, C. R. Some Features of Delta Formation, 228*; — and M. K. Davis. Physiographic Survey of an Area near Terre Haute, Ind., 313*
- Drygalski, E. v. Schelfeis der Antarktis am Gaussberg, 478*; Zeppelin Study Expedition to Spitzbergen, 198; Die Zeppelin-Studienfahrt nach — und ins nördliche Eismeer, 1910, 398*
- Drzevicki, Vs. *Rybnia Promysly Murmana i yevu Kolonizaxia* [Fisheries and Colonisation of the Murman Coast], 316*
- Dubois, E. Hollandsche Duinen, Grondwater en Bodemdaling, 719*
- Dubois, F. Tombouctou en 1909, 396*
- Dubrouillet, J. Reconnaissances sur l'Ogôwé, 555*
- Duchesne-Fournet. Principali studi pubblicati in occasione della missione — in Abissinia. C. C. Rossini, 67*
- Duerden, Prof. J. E. Application of Science to the Ostrich Industry, 396*
- Duffart, C., et F. Bergeron. Les Dunes continentales de Moret-sur-Loing, front oriental de la forêt de Fontainebleau, 718*
- Dühring, Lieut. Entwicklung Nordkameruns, 555*
- Dumas, J. M. Woordenlijst verzameld op de Mimika en Atoeka-Rivieren (Zuid-West-Nieuw-Guinea), 156*
- Dunes. See Sand Dunes.
- Dupaigne, A. Les Montagnes, 239*
- Dupuy, E. Pacification de la Côte d'Ivoire, 396*
- Durance, La. Utilisation de ses eaux, amélioration de son régime, etc. I. Wilhelm, 559*
- Durango, Mexico: Estudio Geológico de la Region de San Pedro del Gallo. Dr. C. Burckhardt, 222*
- Durstine, W. E. Lake Erie and its Southern Ports, 714*
- Dutch East Indies: See East Indies, — Guiana, see under Guiana, — New Guinea, see under New Guinea.
- Dutt, W. A. The Norfolk and Suffolk Coast, *rev.*, 382
- Dyer, G. L. Guam, 558*
- Dyk, G. van. Magnetic Character of Year 1909, 317*
- Dzungaria: The Glacial Group of Muss-Tau. Bl. Rieznicenko. [In Russian], 224*

E.

- Eakin, H. M., *joint author*, see P. S. Smith.
- Earth: ¶ Abhängigkeit einiger geographischen Elemente von dem barischen Relief der Erdoberfläche. Prof. P. Brounow, 73*; Abundance of Meteorites on Painted Desert, and its Bearing upon Planetesimal Hypothesis of Origin of the Earth. C. R. Keyes, 560*; Bearing of Tertiary Mountain Belt on the Origin of Earth's Plan. F. B. Taylor, 228*; Did the Tail of Halley's Comet affect the Earth's Atmosphere? Dr. J. Aitken, 228*; Das Erdbild in Mondentfernung. W. Krebs, 953*; The Face of the Earth. E. Suess. Transl. by H. B. C. Sollas, Vol. IV, *rev.*, 540; Bearing of Tertiary Mountain Belt on the Origin of Earth's Plan. F. B. Taylor, 228*. ¶ Map of the Earth: Kuhnert physikalische Erdkarte in Mercators Projektion mit Darstellung der Meeresströmungen. Dr. G. Leopoldt, *n.*, 235
- Earth Movements: Über Bodenbewegungen. Dr. G. Braun, 317*

- Earth Pillars: Über Erddpyramiden. Dr. Graf W. zu Leiningen, 74*
- Earthquakes: ¶Alaskan Earthquakes of 1899. L. Martin, 151*; Catastrofe sismica Calabro Messinese. M. Baratta, *n.*, 145; La ciencia y los temblores. R. G. Rosell, 715*; Chronological and Historical Account of most Memorable Earthquakes that have happened . . . to 1750, etc., and a letter concerning Earthquakes written in 1693 by J. Flamsteed, 720*; Danni prodotti dai terremoti nella Basilicata e nelle Calabrie. Prof. G. Mercalli, *n.*, 145; Earthquake Epicentres. O. Klotz, 399*; Erdbeben-tätigkeit in Deutsch-Neuguinea. A. Sieberg, 226*; Geschwindigkeit der Erdbebenwellen in Verschiedenen Tiefen. Prof. W. Trabert, 318*; Informe que la Comisión del Observatorio sismográfico presenta a la Sociedad geog. de Lima, 715*; Microseisms. O. Klotz, 399*; Recent Earthquakes. J. Milne, 640*; Relief Model showing Effects of Valparaiso —. G. C. Curtis, 525; Die schwedischen Erdbeben. R. Kjellén, 398*; Study of Damage to Bridges during —'s. Prof. W. H. Hobbs, 74*; Temblores en el Perú, 790*; Terremotos del Año de 1908 (Mexico). M. Miranda y Marrón, 152*; Tremblement de terre de Vernyi. J. Deniker, 637*; Usu-San Eruption and Earthquake and Elevation Phenomena. F. Omori, 951*; Über die Ursachen des Kalifornischen Erdbebens. A. Rothpletz, 714* ¶Maps of Earthquakes: Carta de la región abarcada por el temblor del 26 de Marzo de 1908 [Mexico]. J. F. Romani, 159*; Map showing Relation of Volcanic and Seismic Phenomena in West Hokkaido, 797*
- East, The: Vie politique Orientale en 1909. Dr. G. Samné et Y. M. Goblet, *n.*, 934
- East Indies, A Man of War in the. Being the Log of Commission of H. M. S. "Proserpine," 1908-10, etc. A. W. Furness, *n.*, 219
- East Indies, Dutch: ¶Ausrüstung und Reisepraxis. Erfahrungen auf Forschungsreisen in Niederländisch-Ost-Indien. Dr. W. Volz, 638*; Beschrijving der Eilanden Andonara en Lomblem, behoorende tot de Solor-Groep. J. D. H. Beckering, 638*; De Breukenkust van Mandar. E. C. Abendanon, 637*; Catalogus der Koloniale Bibliotheek . . . Kon. Inst. voor de Taal, Land en Volkenk. van Ned. Indië. Aanwinsten, 156*; Jaarverslag van den Top. Dienst in Nederl.-Indië over 1909, 396*; Voyage de l'Ambassade de la Compagnie des Indes Orientales Hollandaises . . . 1794, etc. André Everard van Braam Houckgeest. Publié en français par M. L. E. Moreau de Saint-Méry, 237* ¶Maps of Dutch East Indies: Map of Amboina and the Moluccas, 472*; Solor-Eilanden. Schetskaarten van het Adonara en Lomblem, 392*; Stand van het Kaarteeringswerk in den Nederlandsch O. I. Archipel, *n.*, 160
- Easter Island (Rapa-Nui) and Rapa (Rapa-Iti) Island. S. P. Smith, 397*
- Eaton, E. H. Birds of New York, 960*
- Eckardt, Dr. W. R. Einfluss des Waldes auf das Klima, 73*; Bird Migrations and Weather, 198
- Eckert, M. Kartenprojektion. Ein geogr.-kartograph. Kapitel . . . Kart-enwissenschaft, 317*
- Economic Geography. See under Geography.
- Edler, F. Dutch Republic and American Revolution, 800*
- Edlinger, L. Wanderung durch das östliche Bosnien, Montenegro und Albien, 477*
- Edmonton City, Alberta. Map: Plan of the City, and Map showing depth of Clover Bar coal seam, etc., 230*
- Edmonton Coal Field, Alberta. D. B. Dowling, 554*
- Edwards, D. M. Toll of the Arctic Seas, *n.*, 786
- Edwards, F. A. Mystery of Zimbabwe, 951*
- Eerde, J. C. van. Vingeramutilatie in Centraal Nieuw-Guinea, 638*
- Égée, Ancien lac —. J. Cvijić, 872*; Map, *n.*, 710
- Eginitis, D. Latitude et longitude d'Athènes, 73*
- Egypt: ¶Archæological Report 1909-10, 555*; Arts and Crafts of Ancient. W. M. F. Petrie, *rev.*, 206; Le commerce de l'ancienne Égypte avec les nations voisines. Prof. E. Naville, 869*; Egypt Exploration Fund. General Index to Archæological Reports. Vols. I-XVIII. W. L. Nash, Compiler, 960*; Thirtieth Memoir. Xlth Dynasty Temple at Deir El-Bahari, Part II. E. Naville and S. Clarke, 236*; Egypt, Nubia and Ethiopia. J. Bonomi *et al.*, 319*; Englische Bewässerungsanlagen in Aegypten und im Sudan mit besonderer Berücksichtigung des Assuan-Staudammes, usw.

- G. R. Rein, 395*; Guide to Antiquities of Upper — from Abydos to the Sudan Frontier. A. E. P. Weigall, *n.*, 927; From Hausaland to — through the Sudan. H. K. W. Kumm, *rev.*, 535; Movements of Subsoil in Upper —. H. T. Ferrar, 950*; The People of. L. Thackeray, *n.*, 303; Phosphate Deposits, 636*; Report on the Work of Survey Department in 1909, 223*; Survey of Egypt. Capt. H. G. Lyons, 67*; Via Cornwall to Egypt. C. F. Gordon-Cumming, 400*; Wirtschaftliche Verhältnisse in Ägypten und den ägyptischen Sudan. M. Schanz, 950* ¶ Maps of Egypt: Égypte et Soudan Égyptien. Atlas Univ. de Géog. V. de Saint-Martin et Fr. Schrader, *n.*, 312; Egypt Survey Dep. 6 sheets, 78*; Geol. Map of Egypt. W. Delta and Libyan Desert, E. Delta and North Arabian Desert, Western Oases, Arabian Desert and Libyan Desert, 391*; Geol. Map of Egypt, 391*; Maps showing location of Wells, 876*; Map of Upper — showing position of localities from which Data on subsoil water were collected 876*; Top. Map of Egypt. El Derr, Korosko, Toshka, Adendan, 391*
 Eisack: Tal und Glazialstudien im unteren Eisackgebiete. Dr. F. Machacek, 315*
 Ekoi, Land of the — Southern Nigeria. P. A. Talbot, 155*
 Elam, Conférence du P. Scheil de l'Institut sur les fouilles et l'histoire de la Babylonie, l'Assyrie et de l'—, 791*
 Electrical Theory, Treatise on — and the Problem of the Universe. G. W. de Tunzelmann, *n.*, 788
 Elkington, E. W. Canada. The Land of Hope, *rev.*, 300; See also N. H. Hardy, *joint author.*
 Ellice, Gilbert and — Islands, 397*
 Ellsworth, C. E. Water Supply of Yukon-Tanana Region, 1909, 635*
 Elm, Der Bergsturz von — den 11. September 1881. E. Buss and A. Heim, 238*
 Emerson, B. K., C. Palache, *et al.* Geology (Harriman Alaska Series), 480*
 Emerson, F. V. Geographic Influences in American Slavery, 13, 106, 170; Manual of Physical Geography, 453
 Emmons, Dr. Samuel Franklin *Obituary*, 294
 Emmons, W. H. Some Ore Deposits in Maine and the Milan Mine, N. H., 313*
 Encyclopædias: ¶ Catholic Encyclopædia. Intern. Work of Reference on Constitution, Doctrine . . . Catholic Church. Vol. IX, 240*, Vol. X, 400*, Vol. XI, 640*; Encyclopædia of Religion and Ethics. Vol. III. J. Hastings, J. A. Selbie and Others, *Editors*, 320*
 Endriss, Dr. W. Quer durch Bithynische Halbinsel, 155*
 Engell, M. C. Bemerkungen über die geographische Lage der Niederlassungen in Westgrönland, 72*; Über die Entstehung der Eisberge, 399*; Nördliches u. südliches Westgrönland (Maps), 80*
 Engerrand, J., and F. Urbina. Informe acerca de una excursión geol. prel. efectuada en El Estado de Yucatan, 868*
 England, Old Country Inns of. H. P. Maskell and E. W. Gregory, *n.*, 933; Book of the English Oak. C. Hurst, *n.*, 944
 Engler, A., and G. Volken. Land- u. Forstwirtschaftlichen Versuchstationen der deutschen Kolonien, 478*
 Engler, Prof. Dr. Divisions phytogéographiques de l'Afrique, 67*
 Erichsen, Mylius, Expédition danoise de — à la côte nord-est du Groenland. Lieut. Trolle, 559*
 Erie Lake and Its Southern Ports. W. E. Durstine, 714*
 Erie-Michigan Canal. W. T. Harris, 960*
 Erkes, H. Meine vierte Islandreise, 1910, 226*
 Ernst, R. Un voyage à travers le Canada français, 949*
 Errera, C. Epoca delle grandi Scoperte Geografiche. *n.*, 787; Portolani italiani del Medioevo. Secondo l'opera di K. Kretschmer, 953*
 Erzgebirge, Das siebenbürgische —. H. Wachner, 316*
 Escale, B. de l'. Afrique Occidentale Française et la Nigeria Anglaise, 68*
 Espinhosa, Itinerario da Expedição — em 1553, 153*
 Estancia Valley, N. M., Maps, 954*
 Etchemin, Paroisse de St. Romuald de. L'abbé B. Demers, *n.*, 924
 Ethiopia. See also Abyssinia: ¶ Khont-Hon-Nofer. The Lands of Ethiopia. H. K. W. Kumm, *rev.*, 925; Egypt, Nubia, and Ethiopia. J. Bonomi *et al.*, 319*
 Ethnograph., Geograph.-Gesellschaft in Zurich, *Jahresbericht*, 1909-10, 316*

- Etiévant, J. Commerce tripolitain dans le centre africain, 69*
- Etna: Eruption of, 858
- Etoshapfanne, Im Gebiet der. D. Hutter, 69*
- Eude, E. Anciennes Capitaines de l'Amazone, 476*
- Eurasia, Northern: Maps accompanying "Ausbreitung kalter Luft in Russland u. Nordasien, 879"
- Europe: ¶ Alphabets en usage dans les principales langues . . . Europe Centrale et les Balkans . . . transcription phonétique. Com. P. Pollacchi, 226*; Some Aspects of Glacial History of Western Europe. Prof. T. G. Bonney, 70*; Comparison of North American and European Glacial Deposits. F. Leverett, 317*; Sur la dernière période glaciaire en Europe et dans l'Amérique du Nord en rapport, etc. N. J. Krichsfawitsch, 317*; Einfluss glazialer und postglazialer Verhältnisse auf die niedere Tierwelt Mitteleuropas, speziell auf deren geog. Verbreitung. Dr. V. Brehm, 718*; Ergebnisse neuerer simultaner Temperaturmessungen in einigen tiefen Seen Europas. Dr. W. Halbfass, 317*; Europe. H. J. Snape. Blackie's Causal Geographies Regionally Treated, n., 866; On Evidences of a Former Land-Bridge between Northern Europe and America. R. F. Scharff, 228*; Geographical and Comparative List of Birds of Europe and North America. Charles Lucien Bonaparte, 320*; Geographical Excursion from Wales to Italy, 919; First Impressions on a Tour upon the Continent in 1818, etc. M. Baillie, 319*; Recent Discoveries Bearing on Antiquity of Man in Europe. G. G. MacCurdy, 477*; Der Kajak im nördlichen. D. MacRitchie, 952*; Scientific Forestry in —: Its Value and Applicability in Canada. Dr. B. E. Fernow, 558*; Steam Voyages on the Seine, the Moselle and the Rhine; with Railroad Visits . . . Cities of Belgium. M. J. Quin, 239*; Wodurch ist die hohe Wärme Europas und des Nordatlantischen Ozeans bedingt? W. Köppen, 638* ¶ Maps of Europe: Bathy-Orographical Map of —, n., 879; G. Freytags Automobil-Routenkarte von Mittel-Europa, n., 79; Generalkarte von Mitteleuropa, n., 552; Glaciated Areas in North America and —, 959*; Goode's Base Maps, n., 712; Literary and Historical Atlas of. J. G. Bartholomew, rev., 382; Mitteleuropäische Eisenbahnnetz beim Ausbruch des deutsch-französischen Krieges, 710*; Physik. polit. Schulwandkarte von. Dr. G. Leipoldt u. M. Kuhnert, n., 235; Positions of Meteorological Stations, observations from which are used in preparation of the British daily weather report, 958*; Verkehrskarte von Mitteleuropa. Dr. G. Leipoldt, n., 235
- Everdingen, Dr. E. van. Drachenbeobachtungen an Bord "de Ruyter" . . . während der Fahrt nach Ost-Indien, usw., 720*; Oberflächentemperaturbeobachtungen in der Nordsee, 228*
- Everett, R. Victoria. Map Geologically compiled and colored, n., 311
- Evolution of Worlds. P. Lowell, n., 388
- Ewart, A. J. Contributions to the Flora of Australia, 156*
- Exama, H., joint author, see M. Snellen.
- Excavations: La Scava; or, Some Account of Excavation of a Roman Town on the Hill of Châtelet, etc. [Stephen Weston], 239*
- Exner, Dr. F. M. Zum Klima von Palästina, 368
- F.
- Fabarius, Prof. E. A. Arbeiten und Aufgaben in Deutsch-Südwestafrika, 791*
- Fairchild, H. L., joint author, see H. P. Cushing.
- Falconer, J. D. Origin of Major Features of Geography of Northern Nigeria, 396*
- Falls, J. C. E. Siwah. Oase des Sonnengottes in der libyschen Wüste, rev., 628
- Faque, L. Indo-Chine Française, n., 376
- Faribault, E. R. Goldbearing Series of Lahave Basin, N. S., 949*
- Faris, R. L. Results of Magnetic Observations . . . Coast and Geod. Survey, 1909-10, 635*
- Farnham, A. W. Origin of Geographic Names, 318*
- Farrington, O. C. Meteorite Studies, 318*
- Farsari, A. Guide to Japan, Keeling's, etc. 4th Ed., revised by, 237*
- Fassig, Dr. O. L. Average Annual Rainfall of Porto Rico, 448; Climate of Porto Rico, 524, 790*, 868*
- Fauchère. Enquête sur la valeur commerciale des produits de Madagascar, 154*
- Fauvel. Le port de Changhai, 315*

- Fawcett, Maj. P. H. Further Explorations in Bolivia: Heath River, 555*; Map of — and Adjacent Territory, 391*; — returns from Bolivia, 54
- Fawcett, W., and A. B. Rendle. Flora of Jamaica, 800*
- Fenneman, N. M. Geographic Influences affecting Early Cincinnati, 714*; Geology and Mineral Resources of St. Louis Quadrangle, 788*
- Ferguson, H. G. Gold Deposits of the Philippine Islands, 638*
- Ferguson, J. Ceylon, Malay States and Java compared as Plantation and Residential Colonies, 638*; On Study of the Indian Architecture, 239*
- Ferguson, W. L. The Present Situation in the Congo, 716*
- Fernandina to Jacksonville, — Entrance, Charts U. S. Coast and Geod. Survey, 545*
- Fernow, B. E. Scientific Forestry in Europe: Its Value and Applicability in Canada, 558*; Swedish Forest Conservation Law, 719*
- Ferrar, H. T. Movements of Subsoil Water in Upper Egypt, 950*
- Ferrari, Capt. G. Basso Giuba italiano e le concessioni agricole nella Goscia, 69*
- Fesca, Dr. Zur Düngung der tropischen Kulturpflanzen, 317*; Pflanzenbau in den Tropen und Subtropen, *n.*, 937
- Fester, Dr. G. Geographische Charakterbilder aus der Krim, 952*
- Fetz, A. Idee zur Einrichtung eines "Geographiesaales" in mehrklassigen Schulen, 72*
- Fèvre, J. et H. Hauser. Régions et Pays de France, *n.*, 539; see also H. Busson, *joint author.*
- Fewkes, J. W. Cave Dwellers of the Old and New Worlds, 399*; Preliminary Report on a Visit to the Navaho National Monument, Ariz., 788*
- Fez: ¶Fez, 951*; With Mulai Hafid at — Behind the Scenes in Morocco. L. Harris, *rev.*, 459 ¶Map of Fez: Plan de la Ville de, 708*
- Fidel, C. Les intérêts Italiens en Tunisie, 715*
- Filchner, W. Die Deutsche Antarktische Expedition, 228*; Filchner's Plans, 200, 290
- Filippi, F. de. The Duke of the Abruzzi's Expedition to the Karakoram, 225*
- Finland: ¶Sur la géomorphologie de la Finlande. Dr. J. J. Sederholm, 71*; Finnish Self-Taught. Thimm's System. A. Renfors, *n.*, 149
- Fiore, P. Remarks on Arbitral Sentence . . . on Boundary Question between Bolivia and Peru, 800*
- Fire Island Beach to Rockaway Beach, Chart U. S. Coast and Geod. Surv., 545
- Fischer, Prof. T. Berlin. Principal centre de la circulation continentale en Europe, 558*
- Fish and Fisheries: ¶Beitrag zur Kenntnis der Fische des Jangtze und seiner Zuflüsse. Dr. Kreyenberg, 70*; Catalogue of Fresh-Water Fishes of Africa in the British Museum. G. A. Boulenger, 314*; Das chinesische Fischerwesen. L. Katscher, 156*; La pêche à marée basse. R. Legendre, 317*; Pêche et Poissons au Congo Belge. Capt. Wilverth, 716*; Report on Herring Investigations until Jan., 1910. J. Hjort, 559*; Saving our Fish (U. S.). D. Wallace, 948*; Untersuchungen über den Hummer. Dr. A. Appellöf, 317*
- Fishers Is. Sound, Chart U. S. Coast and Geod. Surv., 875*
- Fitch, M. H. Chattanooga Campaign, with especial reference to Wisconsin's participation, 880*
- Flamsteed, John. A Letter Concerning Earthquakes written in 1693 by —, 720*
- Flattery, Cape — to Dixon Entrance, Chart U. S. Coast and Geod. Surv., 631*
- Fletcher, W. I., and Others. Annual Library Index, 1910, 560*
- Flind, J. Ferrocarril de la Guaira a Caracas, 636*
- Flora. See Plants.
- Florence Oil Field, Col. C. W. Washburne, 152*
- Florida: ¶Dos Antiguas Relaciones de Florida. G. García, 480* ¶Maps of Florida: Geol. Map of North-Central Part of — suggesting oscillations of Ocala dome, 954*; Marianna Area, Soil Survey, 77*; Production of cotton in 1909, 229* ¶Charts U. S. Coast and Geod. Survey: Fernandina Entrance; Fernandina to Jacksonville; St. Johns R. from Jacksonville to Hibernia; Key West Harbor and Approaches, Main Entrance to Charlotte Harbor, 545*
- Foerster, M. H. Some Facts on Forestry Conditions in Sweden, 719*
- Föhn: See under Winds.
- Follansbee, R., A. H. Horton and R. H. Bolster. Hudson Bay, Hudson Bay and Upper Mississippi, and Minnesota R. Drainage Basins, 867*; Illi-

- nois R., Kaskaskia R., and Wisconsin R. Drainage Basins, 948*; Upper Mississippi R. Drainage Basin, 789*
- Forbes, E. A. Notes on the only American Colony in the World [Liberia], 69*
- Force, P. Grinnell Land. Remarks on English Maps of Arctic Discoveries, 1850-51, etc., 400*
- (Ford, Worthington Chauncey, *editor*). Diary of Cotton Mather, 1681-1708, 560*
- Fordham, Sir Herbert G. Liste alphabétique des plans et vues de Villes, Citadelles et Forteresses . . . dans le grand Atlas de Mortier. Édition de Amsterdam, 1696, 640*
- Foreign Missions, Centennial Survey of. Rev. J. S. Dennis, 320*
- Forel, Dr. F. A. Association Internationale de Sismologie, 73*; — and E. Muret. Variations périodiques des glaciers, 478*
- Forests and Forestry: ¶Einfluss des Waldes auf das Klima. Dr. W. R. Eckardt, 73*; Forest Fires and their Prevention. J. S. Holmes, 960*; Trees, Forestry and Lumbering, List of Books, etc., 952*; Waldbrände und die Möglichkeit ihrer Bekämpfung. E. O. Rasser, 872*; ¶Richesse forestière de la province de Québec. Hon. J. Allard, 554*; A Railroad's Forest Enterprise, 685; ¶Commercio e l'industria dei prodotti forestali in Italia. Prof. G. Assereto, 227*; ¶Liesnoye Dielo [Forest Problems in Northern Russia], 316*; ¶Recul du pin sylvestre dans les montagnes de la Suède. C. Rabot, 719*; Some Facts on Forestry Conditions in Sweden. M. H. Foerster, 719*; Swedish Forest Conservation Law. B. E. Fernow, 719*; ¶Appalachian Forests, 789*; Present Forest Problems of Massachusetts. A. Chamberlain, 948*, Reforestation in —. F. W. Rane, 789*; Present Forestry Issues. Hon. C. Guild, Jr., 394*; Protecting our Forests from Fire. Hon. J. Wilson, 394*; State Ownership of Forests. A. F. Hawes, 553*; White Pines of Montana and Idaho. Their Distribution, Quality and Uses. F. I. Rockwell, 867*
- Formosa: ¶Les aborigènes de —. R. Torii, 717*; Among the Sons of Han. Notes . . . Residence . . . China and Formosa. Mrs. T. F. Hughes, 237*; L'île Formose. Halot, 225*; Statistical Report on [in Japanese], 720*
- ¶Map of Formosa: Carte ethnographique de Formose, 550*
- Forrest, R. E. Industrial Development in India, 477*
- Forstner, W. Occurrence of Oil and Gas in South Midway Field, Kern Co., Cal., 553*
- Fortescue, G. Galapagos Islands, 557*
- Forthomme, P. Véritable signification du Katanga pour la Belgique, 950*
- Foster, W. English Factories in India, 1634-1636, 560*
- Fouchier, L. et C. de. A travers la Calabre, 227*
- Fowke, G. Antiquities of Central and S. E. Missouri, 474*; Map of Archaeological Sites in Missouri, 158*
- Fox, Dr. R. Oberflächengestaltung des norddeutschen Flachlandes nach Wahnschaffe, 558*
- Föyn, N. J. Klima von Bergen, 316*
- France: ¶Cathedrals of Northern —. T. F. Bumpus, *n.*, 702; Dérivations glaciaires de cours d'eau . . . et le Jura français. Prof. H. Schardt, 71*; Les Dunes continentales de Moret-sur-Loing, front oriental de la forêt de Fontainebleau. C. Duffart et F. Bergeron, 718*; Étude du profil en long des cours d'eau français. E. de Margerie, 71*; Expansion de la langue française dans le monde. J. de Novicov, 479*; Glaciations des Alpes françaises. J. Révil, 477*; Greenwich Time Adopted in, 289; Landeskunde von Frankreich. Dr. R. Neuse, *n.*, 383; Sur la morphologie de la partie médiane et orientale du Massif Central. A. Briquet, 718*; Nivellement général . . . progrès de 1899 à 1908. Ch. Lallemand, 71* La pluie en France en 1910. L. Rudaux, 638*; Progrès récents de la topographie et géodésie de haute montagne en. H. Vallot, 73*; Régions et Pays de France. J. Fèvre et H. Hauser, *n.*, 539; Schneegrenzen in den französischen Alpen. Dr. V. Paschinger, 793*; Picturesque Tour through France, Switzerland, etc., in 1816. [Joseph Mawman], 238* ¶Travels in — 1818. Lieut. F. Hall, 320*; Variations périodiques des glaciers. 1909. Alpes françaises et Pyrénées. C. Rabot, 558*; Über Wüstenbildungen in der Chelléen-Interglaciale von Frankreich. P. Sarasin, 226* ¶Economic: Coal Basin of Decazeville. J. J. Stevenson, 793*; Études sur les Gisements de Mollusques comestibles des Côtes de France. L. Joubin, 315*; Notes prélim. sur les

- Gisements de Mollusques comestibles des Côtes de France. J. Guérin-Ganivet, 226*, 638*; Grands Ports de France, leur Rôle économique. P. de Rousiers, *rev.*, 702; Limite septentrionale de l'olivier dans les Alpes françaises. R. Blanchard, 558*; Northern Limit of the Olive, etc. (*rev.*), 397*; Notre Territoire agricole, 871*; Les ouvriers du coton dans la région de Rouen. J. Levainville, 558*; Ressources de la France en minerais de fer. P. Lemoine, 477*; Wasserkräfte Frankreichs. W. Wohlrahe, 71*; La France et ses Colonies. H. Busson, J. Fèvre et H. Hauser, *n.*, 148
- ¶ Maps of France: Carte au 50,000^e dérivée des levés à grande échelle, *n.*, 551; Carte aéronautique: Feuille Châlons, *n.*, 878; Carte des Gisements de Coquilles comestibles de la Côte du Finistère. J. Guérin-Ganivet, 392*, — de la rade de Brest, etc. J. Guérin-Ganivet, 234*; Carte tectonique de la région charentaise; les différents cycles d'érosion de la région de la Charente, *n.*, 710; Dessin-Modèle du rocher en haute montagne: le Cirque du Creux Noir, *n.*, 960; État d'avancement au point de vue cartographique des travaux de révision, *n.*, 551; Étude du profil en long des cours d'eau français. État d'avancement en 1910, 79*; Glaciers du Massif des Grandes Rousses, 392*; Goode's Base Map, *n.*, 712; Limite de la montagne dans le Limousin, 878*; Schéma orogr. hydrogr. du Massif des Grandes Rousses. Ch. Jacob, 393*; Schéma des extensions glaciaires les plus récentes dans le Massif des Grandes Rousses. Ch. Jacob, 393*
- France. Colonies: ¶ Commerce des colonies françaises, 639*; Statistiques du Commerce des colonies françaises pour 1908, 559*, 636*, 639*, 716*, 789*, 791*, 792*, 793*; Le coton dans les colonies françaises, 871*; Enseignement aux indigènes: Madagascar — Indo-Chine — Colonies britanniques, *n.*, 149; Statistiques de l'Industrie minière dans les colonies françaises, 1908, 639*, 791*, 792*, 793*, 868*, 870*; Statistiques de la Navigation dans les colonies françaises, 1909, 639*
- Franck, Dr. F., *joint author*, see Dr. E. Marckwald.
- Franck, H. A. Vagabond Journey Around the World, *rev.*, 216
- Franconia. Der Steigerwald: ein Beitrag zur Geographie Frankens, *rev.*, J. Schwender, 679
- Frank, Dr. L. Beziehungen zwischen Regenfall u. Quellergiebigkeit, unter besonderer Berücksichtigung Münchener Wasserversorgung und der Kissingener Quellen, 871*
- Fraser, Sir Andrew H. L. Among Indian Rajahs and Ryots, *n.*, 538
- Fraser, J. F. Australia: The Making of a Nation, *rev.*, 379
- Frech, Prof. Dr. F. Über die geologische Entwicklung Chinas, 156*
- Free, E. E. Movement of Soil Material by the Wind, 953*; See also S. C. Stuntz, *joint author*.
- Freer, P. C. The Study of Manila Copal, 225*
- Freeston, C. L. High-Roads of the Alps, *rev.*, 381, 934
- Freitas, J. A. de. O 2^o Visconde de Santares e os seus Atlas Geográficos, *n.*, 215
- French Equatorial Africa. See under Africa; — Guiana: See under Guiana; — Guinea. See under Guinea; — India. See under India; — West Africa: See under Africa.
- French Language: Expansion de la langue française dans le monde. J. de Novicov, 479*
- Frers, E. Resultados obtenidos en el Segundo Congreso Internacional del Frio, 873*
- Freytag's Automobile- und Radfahrer-Karten, Brünn; Südtirol und Oberitalien, 79*; — Automobil-Routenkarte von Mittel-Europa, 79*
- Fribourg: ¶ Études de géographie physique sur le canton de —, 952*; — et son site géographique. Étude de géographie urbaine. Prof. P. Girardin, 559* ¶ Maps of Fribourg: Maps accompanying "Coudes de Capture" du pays fribourgeois. G. Michel, 959*; Maps illustrating "Les Cirques de Montagne" (Alpes fribourgeoises, etc.), M. Koncza, 959*
- Friederici, Dr. G. In das Hinterland der Nordküste der Kaiser Wilhelmsländes, 156*
- Friedländer, Dr. E., Project of International Institute of Vulcanology in Naples, 60
- Fritsche, Dr. H. Die saecularen Aenderungen der Erdmagnetischen Elemente, 317*
- Froidevaux, H. Œuvre de la Mission hydrographique du Maroc, 790*
- Früh, Dr. J. Einbruch des Lötschberg-tunnels unter dem Gasterntal, 71*

- Frye, T. C. Height and Dominance of Douglas Fir, 221*
- Fryer, J. C. F. South-West Indian Ocean (Account of Aldabra and certain Neighboring Islands . . . not explored by Prof. J. S. Gardiner), 316*
- Fuller, M. L., *joint author*, see C. W. Hall.
- Furness, A. W. A Man of War in the East Indies, *n.*, 219
- Furniss, H. W. Developments in Haiti, 475*
- Fur Seal Treaty, 622
- Fürst, Carl M. Notes on Anthropological Problems and Their Social Applications, 479*
- Fynn, Dr. E., Jr. The Dairy Industry in Argentine Republic, 314*
- G.
- Gagnon, E. Louis Jolliet, découvreur du Mississipi, etc., 318*
- Galapagos Islands. G. Fortescue, 557*
- Galdieri, A. Terrazze orografiche dell' alto Picentino a nord-est di Salerno, 603
- Gale, H. S. Coal Fields of N. W. Colorado and N. E. Utah, 313*; Phosphates in Montana, 313*; —, R. W. Richards and E. Blackwelder. Phosphates, 221*; — and C. H. Wegemann. Buffalo Coal Field, Wyo., 313*
- Galilee, Studies in. E. W. G. Masterman, *rev.*, 209
- Gallois, E. Sur la crue de la Seine de Janvier 1910, 718*; L'olivier et le palmier en Tunisie, 69*
- Galveston Bay and — Entrance, Charts U. S. Coast and Geod. Surv., 157*
- Gambia, Agricultural Labour Conditions in. Dr. E. Hopkinson, 556*
- Gäng, P. M. Die Pest in Ost-Shantung, 792*
- Ganges, Historical Map: Fac-similé de la Figure III de la *Carte générale* du cours du Gange et du Gagra . . . 1784; Fac-similé de la Figure VI de la *Carte générale*, (Fausse Source du Gange), 879*
- Gannett, H. Population of the United States, 394*; United States, Relief Map, *n.*, 76
- García, G. Dos Antiguas Relaciones de la Florida, 480*; Carácter de la Conquista Española en América y en México, etc., 480*; Historia Verdadera de la Conquista de la Nueva España por Bernal Diaz del Castillo . . . única edición, etc., 480*; Juarez, Refutación a Don Francisco Bulnes por —, 480*; —, *Editor*. Mexico durante su guerra con los Estados Unidos. Documentos inéditos . . . Don Juan de Palafox y Mendoza, 480*; Tumultos y Rebeliones Acéridos en México. Documentos inéditos pub. por —, 480*; Su virreinato en la Nueva España, etc. Don J. de Palafox y Mendoza, 480*
- Gard, Recherches spéléologiques dans le Département du. 1904-9. F. Mazauric, 315*
- Gardner, J. H. Carthage Coal Field, N. M., 313*; Coal Field between San Mateo and Cuba, N. M., 313*; Isolated Coal Fields in Santa Fé and San Miguel Cos., N. M., 151*
- Garos, The. Maj. A. Playfair, *n.*, 65
- Garwood, Prof. E. J. Features of Alpine Scenery due to Glacial Protection, 315*; Glacial Erosion, 202
- Gautier, Contessa. The Streets of Rome, 793*
- Gautier, E. F. La Conquête du Sahara. Essai de psychologie politique, *rev.*, 695; Sahara algérien, *rev.*, 140
- Gavelin, A. Carte de la Laponie suédoise indiquant la distribution des gisements de pin sylvestre et de bouleau subfossiles, 551*
- Gazaland: Through Gasa Land and the Scene of Portuguese Aggression. P. Gillmore, 319*
- Geer, G. de. Das Spätglaciale Süd-Schweden. Übersichtskarte mit Osen, Endmoränen und Schrammen (Swedish Geol. Surv.), *n.*, 711
- Geer, S. de. Karte öfver Mellersta Sveriges Landformer af, 711*
- Geerligs, H. C. Prinsen. Rietsuiker-industrie van productie. Brazilië, 222*
- Geil, W. E. Lecture on Land of the Great Wall, 132
- Geistbeck, A. Erdkundlicher Unterricht und staatsbürgerliche Erziehung, 640*
- Genève à Milan, Lettres sur la Route de — par le Simplon écrites en 1809. G. Mallet, 10^{me} éd., 238*
- Gennerich, E. Die Flüsse Deutschlands, *n.*, 934
- Genoa, Map: Genova, *n.*, 311
- Genthe, M. K. Geography in Germany and the U. S., 291
- Gentil, L. Amalat d'Oujda. Étude de géographie physique, 790*; Une leçon de géographie physique sur le Maroc, 476*
- Geodesy, Progress in. A. R. Hinks, 530
- Geographen-Kalender, 1911, *rev.*, 467
- Geographic Nomenclature: ¶ Decisions of U. S. Geographic Board, 66, 394, 475, 635, 715, 789, 867, 949*; Revision of previous Decisions, 635,

- 715*; ¶ Geographic Board of Canada, Decisions, 66, 394, 554, 635, 715, 949*; Origin of Geographic Names. A. W. Farnham, 318*; Regional Peculiarities in Place Names. R. H. Whitbeck, 273
- Geographical Association, Students', —, 451
- Geographical Atlases, List of — in the Library of Congress, *rev.*, 312
- Geographical Bibliography: Bibliotheca Geographica, Jahresbib. geogr. Literatur. Dr. O. Baschin, *n.*, 150
- Geographical Biology: See Biogeography.
- Geographical Congresses: II VII Congresso Geog. Italiano, 478*; *Compte Rendu des Travaux du Congrès. Neuv. Congrès Intern. de Géog. A. de Claparède*, Vol. I, 74*; III, 873*; French Geog. Congress, 203; Tenth Intern. Geog. Congress postponed, 922
- Geographical Equipment of the Cleveland Normal School. W. M. Gregory, 453
- Geographical Excursion from Wales to Italy, 919
- Geographical Explorations: Geographische Forschungsreisen und ihre Ziele. Dr. B. Bruhns, *rev.*, 215
- Geographical Literature and Maps. Accessions to the Library, 61, 139, 205, 295, 373, 455, 531, 625, 693, 781, 863, 923
- Geographical Papers, Current:
- North America, 66, 151, 221, 313, 394, 474, 553, 635, 714, 788, 867, 947
 - Central America and West Indies, 67, 152, 475, 554, 636, 789, 868, 949
 - South America, 67, 152, 222, 314, 395, 475, 555, 636, 715, 790, 868, 949
 - Africa, 67, 153, 223, 314, 395, 476, 555, 636, 715, 790, 869, 950
 - Asia, 70, 155, 224, 315, 396, 477, 556, 636, 717, 791, 870, 951
 - Australasia and Oceania, 70, 156, 225, 397, 477, 557, 638, 718, 792, 871, 952
 - Europe, 70, 157, 226, 315, 397, 477, 558, 638, 718, 792, 871, 952
 - Polar Regions, 72, 227, 398, 478, 559, 639, 719, 794, 872, 952
 - Islands of the Atlantic, 316, 872 — of the Indian Ocean, 316, — of the Pacific Ocean, 228
- Anthropogeography, 316, 559
- Anthropology, 72, 398, 479
- Cartography and Mathematical Geography, 72, 316, 399, 639, 953
- Economic Geography, 72, 317, 399, 479, 559, 639, 719, 794, 872, 952
- Educational, 72, 399, 640
- Historical Geography, 559, 640
- Ontography, 399, 872
- Physical Geography, 73, 228, 317, 399, 479, 560, 640, 720, 794, 872, 953
- General, 74, 228, 318, 399, 479, 640, 794, 872, 953
- Geographical Record, 51, 130, 195, 283, 365, 447, 518, 618, 685, 775, 854, 916
- Geographical Societies. Maj. L. Darwin, 779
- Geographical Society of Chicago, Excursions of, 922
- Geograph.-ethnographische Gesellschaft in Zurich, *Jahresbericht*, 1909-10, 316*
- Geographisches Jahrbuch, for 1910. Dr. H. Wagner *et al.*, 560*, *n.*, 705
- Geography: ¶ Erdkundlicher Unterricht und staatsbürgerlicher Erziehung. A. Geistbeck, 640*; Fascination of Geography. K. Qualtrough, 794*; Geographical Descriptions as Reflections of Preparatory Equipment. W. M. Davis, 847; Geographie auf der Naturforscherversammlung, F. Hahn, 794*; Geographisches Seminar in Göttingen. E. Harms and O. Kämpfer, 72*; Guide to Geographical Books and Appliances. *n.*, H. R. Mill, 942; Idee zur Einrichtung eines "Geographiesaales" in mehrklassigen Schulen. A. Fetz, 72*; Geography in Germany and the U. S. M. K. Genthe, 291; Modern Geography. M. I. Newbigin, *rev.*, 942; Nations of the World. Elementary Study in Geography. H. J. Mackinder, *n.*, 543; Pflege der Geographie an der Berliner Universität im ersten Jahrhundert ihres Bestehens. Dr. H. Wagner, 316*; Purpose and Position of. Col. C. F. Close, 740; Reformvorschläge des Deutschen Geographentages für den erdkundlichen Unterricht an den höheren Schulen, 952*; Riforme urgenti per la geografia nelle Università Italiane. G. Dalla Vedova, C. Bertacchi and others, 952*
- Anthropogeography: Fribourg et son site géographique. Étude de Géographie urbaine. P. Girardin, 559*; Géographie humaine. Essai de classification. J. Brunhes, *rev.*, 467; Geographic Influences in American Slavery. F. V. Emerson, 13, 106, 170; Influences of Geographic Environment on the Basis of Ratzel's System of Anthro-Geography. E. C. Semple, *rev.*, 937
- Biogeography, Shackleton's contribution to. C. H. T. Townsend, 479*
- Colonial Geography: Dr. H. Meyer's

donation for professorship of Colonial Geography, 60; Wesen und Aufgaben der kolonialen Geographie. Dr. F. Jaeger, 953*

Comparative Geography: Statistique annuelle de Géographie comparée. J. Birot, *rev.*, 466

Economic Geography: Causes of Increased Cost of Agricultural Staples. E. D. Jones, 399*; Some Factors influencing the Location and Migration of Industries. Prof. W. S. Tower, 639*; Geographie und Verkehrswissenschaft. Dr. R. Hennig, 794*; Géographie des textiles. P. Clerget, 479*; Medizinische Geographie. Prof. Dr. Dove, 794*; Spécialisation des Jardins botaniques dans les recherches d'agriculture tropicale. Dr. G. Capus, 479*; Trade Routes. Past and Present — East and West. R. Kalisch, 399*

Historical Geography: August Petermann: Ein Beitrag zur Geschichte der geographischen Entdeckungen und der Kartographie im 19. Jahrhundert. Dr. E. Weller, *rev.*, 845; Claudius Clavus and the Early Geography of the North. E. Heawood, 228*; Le commerce de l'ancienne Égypte avec les nations voisines. Prof. E. Naville, 869*; Epoca delle grandi Scoperte geografiche. C. Errera, *n.*, 787; Establishment of Michigan's Boundaries: A Study in Historical Geography, 339; Report of Conference on the Relations of Geography to History. E. E. Sparks, 317*; Syndicat de Navigation à Périgueux pour la rivière de l'Isle en 1520. F. Villepelet, 719*

Mathematical Geography: Unterricht in der mathematischen und astronomischen Geographie nach Umfang und Methode. A. Müller, 318*

Physical Geography: Cosmos: Sketch of Physical Description of the Universe. A. von Humboldt, 320*

Political Geography: Zur Geographie der politischen Grenzen. Dr. H. Walser, 318*; Politische Wirtschaftsgeographie. A. Dix, 317*

School Geography: Commercial Geography. A. P. Brigham, *rev.*, 940; Commercial Geography. E. Van Dyke Robinson, *rev.*, 384; Highroads of Geography. Royal School Series, *rev.*, 941; Industrial and Commercial Geography. C. Morris, *rev.*, 385; Lehrbuch der Erdkunde für höhere Schulen. A. Steinhauff und Dr. M. G. Schmidt, *n.*, 219; Manual of Physical Geography. Dr. F. V. Emerson, 453;

Oxford Geographies. Vol. III. Senior Geography. A. J. Herbertson, *n.*, 149; Physical Geography. Purpose of the Course—Training for Service. Prof. C. Cobb, 479*; Physiographical Introduction to Geography. A. J. Herbertson, *n.*, 219; Present Problems in Elementary School Geography. W. M. Gregory, 452

Zoogeography: ¶ Distribution géographique des races antiques parmi les animaux domestiques. Dr. C. Keller, 74* ¶ Maps accompanying "Zoogeography" (*rev.* Bartholomew's Atlas of), 959*

Geologen-Kalender, 1911-12, *rev.*, 786

Geologic Work of Ants. Prof. J. C. Branner, 293

Geological International Congress at Stockholm, 227*; Spitzbergen Excursion of. Prof. R. S. Tarr, 31

Geological Society of South Africa, *Proceedings* for 1910, 637*

Geology: ¶ Climates of Geological Past. H. J. Jensen, 317*; Economic Geology. With special Reference to the U. S. H. Ries, *rev.*, 219; Elements of Geology. E. Blackwelder and H. H. Barrows, *rev.*, 939; Geologische Charakterbilder. Herausgegeben von Dr. H. Stille, Heft 2, und 3, *n.*, 215; Lehrbuch der Geologie. Dr. E. Kayser, *rev.*, 307; Outlines of Geologic History, with Special Reference to North America, *rev.*, 297; ¶ Aeolian Geology: Bibliography of. S. C. Stuntz and E. E. Free, 953*; Movement of Soil Material by the Wind. E. E. Free, 953* ¶ Map of Portion of Land Hemisphere showing Paleozoic land connections and paths of marine faunal migrations, 959*

Geomorphology: ¶ Notes on the Description of Land Forms. Prof. W. M. Davis, 46, 190, 598, 679, 847; Place of Deduction in Description of Land Forms. W. M. Davis, 598; Repeating Patterns in the Relief and in the Structure of the Land. W. H. Hobbs, 719*; Terminologie der Oberflächenformen. A. Hettner, 640*

Georgia: ¶ Preliminary Report on Drainage Reclamation in. S. W. McCallie, 880*; Results of Spirit Levelling, etc. R. B. Marshall, 313*; Wire-Grass Country of Southern —. R. M. Harper, 522 ¶ Maps of Georgia: Ellijay Quadr., 389*; Map to Show Distribution of Granites and Granite Quarries, 76*; Map showing production of Cotton in 1909, 229*; Soil Survey Map of Franklin Co.,

- 77*; — of Pike Co., 229*; Chart U. S. Coast and Geod. Surv.; Georgia from Hunting Island to Ossabaw Island, 76*
- Georgian Bay: Rapport de l'exploration à la Baie Georgienne. C. Legge, 560*
- Georlette, F. A. La métamorphose de la capitale du Brésil, 790*
- Gerland, Dr. G. Seismische Verhalten des Atlantischen und des Pazifischen Ozeans, 73*
- German Asiatic Society: *Asien*, 137
- German Colonies: Deutsch-koloniale Baumwoll-Unternehmungen. K. Supf, 398*, 871*; Deutsche Kolonialschule in Witzhausen. Dr. M. G. Schmidt, 952*; Drahtlose Telegraphie und die deutschen Kolonien, 793*; Ergebnisse der Regenmessungen im Jahre 1909, 557*; Förderung der Wollschafzucht in den deutschen Kolonien, 478*; Fortschritte der deutschen Kolonial-Kartographie in den Jahren 1905-10. P. Sprigade and M. Moisel, 316*; Kautschuk-Plantagenbau in seiner Bedeutung und seinen Gefahren für die deutsche Kolonialwirtschaft. Dr. E. Marckwald and Dr. F. Frank, 639*; Kurze Charakteristik des Klimas der deutschen Schutzgebiete. H. Maurer, 639*; Land-u.-Forstwirtschaftlichen Versuchstationen der deutschen Kolonien. A. Engler and G. Volkens, 478*; Dr. H. Meyer's Donation for professorship of Colonial Geography, 60; Les possessions allemandes dans la mer du Sud. L. Nemry, 557*; Ueber das Schulwesen unserer Schutzgebiete. Dr. C. G. Barth, 639*; Viehzucht in den deutschen Kolonien. Dr. Schilling, 227*; Wirtschaftlichen Fortschritte in unseren afrikanischen Kolonien. Maj. W. Langheld, 791*
- German East Africa, see under Africa. — German New Guinea. See under New Guinea and Kaiser Wilhelms Land. German Southwest Africa. See under Africa.
- Germany: ¶ Beiträge zur Bevölkerung- und Siedlungsgeographie Deutschlands. Dr. O. Schlüter, 227*; Colonial Education in. L. Hamilton, 398; Completion of the Map of German Empire in 1:100,000, 450; Eisverhältnisse an den deutschen Küsten im Winter 1910/11, 952*; Die Flüsse Deutschlands. E. Gennerich, n., 934; Geographical Instruction in German Elementary Schools. A. Jahr, 639*; Reformvorschläge . . . für den erdkundlichen Unterricht an den höheren Schulen, 952*; Grosse erratische Blöcke im norddeutschen Flachlande. (Geol. Charakterbilder). Dr. F. Wahnschaffe, n., 215; Grosstädte des Deutschen Reichs. H. Wichmann, 398*; Jahrbuch der k. k. geol. Reichsanstalt, 1910, 316*; Man and his Environment in. R. S. Tarr, 227*; Mineral Production of Germany in 1910, 952*; Oberflächengestaltung des Norddeutschen Flachlandes. Dr. F. Wahnschaffe, *rev.*, 212; — nach Wahnschaffe. Dr. R. Fox, 558*; Neuere ozeanographische Arbeiten der Deutschen Marine, insbesondere der Seewarte. Dr. G. Schott, 74*; Population of Germany, 1910, 370; Situation économique. G. Blondel, 226*; Spuren der Eiszeiten in Norddeutschland und Versuch ihrer Deutung. H. Habenicht, 71*; Studien über Nordostdeutsche Inlanddünen. Dr. F. Solger, n., 144; Tabellarische Reiseberichte nach meteorologischen Schifftagebüchern, 74*; Die Winde in Deutschland. Dr. K. Knoch, 793*; Wüstenformen in Deutschland? Dr. A. Hettner, 315* ¶ Maps of Germany: Geol. Karte des Dammersfeldes in der Rhön und seine südwestlichen Umgebung. O. Drehe, 958*; Geol. Übersichtskarte Nordwestdeutschlands, 878*; German School Wall Maps, n., 235; Goode's Base Map, n., 712; Isochronenkarte des Gesamtverkehrs für Mitteldeutschland mit dem Ausgangspunkt Leipzig; Isochronenkarte des Gesamtverkehrs für die weitere Umgebung von Leipzig, 711*; Körper-Geographie: Abweichung der altsächsischen Hausgrenze von niederdeutschen und niedersächsischen Sprachgrenze, 878*; Nordwestdeutschland, Sprach-Geog.; Sach-Geog., 878*; Map showing glacial geology of region between Elbe and Lübeck, 958*; Nordwestdeutschland. Versuch einer Karte der verschiedenen Orten des Fensteröffnens, n., 878; Overzichtskaart van de tot heden bekende Veenbruggen in Nederland en N. W. Duitschland, 959*; Verbreitung der Salzflora in Anhalt, Provinz-Sachsen und Mark Brandenburg, 958*; Sturmflut . . . an der Küste Pommerns. Dr. G. Krüger, 710*; Verkehrsgeographische Bedeutung der Deutschen Reichsgrenze, 958*
- Gerste, A. Notes sur la Médecine et la

- Botanique des anciens Mexicains, 395*
- Giacchi, G. Bosnia-Erzegovina sotto l'aspetto storico, etc., 157*
- Giannitrapani, Capt. L. Grandi Comunicazioni di Terre e di Mare, n., 946
- Gibson, C. G. Geol. Sketch Map of Country along Route of Proposed Trans-Continental R.R. (Australia), n., 311
- Gibson, H. Evolution of Live-Stock Breeding in Argentina, 314*
- Gilbert, Dr. Grove K., Award of Daly Medal to, 51
- Gilbert Islands: Die heutige Lage der Gilbert-Insulaner, 228*; — and Ellice Islands, 397*
- Gill, T. Biographical Sketch of Col. William Light, the First Surveyor-General of Australia, 718*
- Gillmore, P. Through Gasa Land, and the Scene of Portuguese Aggression, 319*
- Gilly, W. S. Narrative of an Excursion to the Mountains of Piemont . . . Researches among the Vaudois, etc., 238*
- Girardin, Prof. P. Fribourg et son site géographique. Étude de Géographie urbaine, 559*; Rôle des conditions topographiques dans le développement des villes suisses, 871*
- Girola, C. D. Cultivation of Plants for Industrial Purposes in Argentina, 314*
- Gironcourt, G. de. Mission en Afrique Occidentale, 950*
- Givenchy, C. de. Évolution économique et sociale de la Tunisie, 869*
- Glaciation and Glaciers: ¶ État actuel des études glaciaires. Prof. P. L. Mercanton, 74*; Characteristics of Existing Glaciers. W. H. Hobbs, *rev.*, 934; Über die Entstehung der Eisberge. M. C. Engell, 399*; Glacial Erosion. Prof. E. J. Garwood, 202, Certain Phases of —. T. C. and R. T. Chamberlin, 720* Glazialer Karreoder Polygonenboden. Dr. W. Ule, 872*; Glacial Theory. [The Duke of] Argyll, 239*; Theory of Advance of Glaciers in response to Earthquake shaking. R. S. Tarr, 399*; Pleistocene Glaciation and Coral Reef Problem. R. A. Daly, 399*; Pleistozäne Hebungen und Vergletscherung. Prof. J. Cvijić, 73*; "Rock Glaciers" or Chrystocrenes. J. B. Tyrrell, 318*; ¶ Reports on Recent Glacier movements. Bericht der internat. Gletscherkommission für 1907-10. Dr. Ed. Brückner, 794*; Revue de Glaciologie. C. Rabot, 317* Variations of Glaciers. H. F. Reid, 318*; Variations périodiques des glaciers. XV^m Rapport, 1909. Dr. Ed. Brückner and E. Muret, Editors, 794*; Variations périodiques des glaciers, 1909. Alpes françaises et Pyrénées. C. Rabot, 558*; Alpes italiennes. Prof. O. Marinelli, 478*; Alpes orientales. Dr. Ed. Brückner, 477*; États-Unis. H. F. Reid, 635*; Norvège. P. A. Øyen, 559*; Russie. J. de Schokalsky, 559*; Suède. Dr. A. Hamberg, 559* ¶ Regional Studies of Glaciation: Comparison of North American and European Glacial Deposits. F. Leverett, 201; Pleistocene Glaciation of North America viewed in the Light of Our Knowledge of Existing Continental Glaciers. W. H. Hobbs, 641; Glacial Advance in Alaska and Earthquakes. Prof. R. S. Tarr, 285; Glacial Studies in Alaska, 448; Glaciers of the West Coast of Prince William Sound and the Southern part of Kenai Peninsula. U. S. Grant and D. F. Higgins, 321, 401, 721; Extension of the Known Area of Pleistocene Glaciation to the Coast Ranges of California. R. S. Holway, 161; Terminal Moraine of the Puget Sound Glacier. J. H. Bretz, 714* Glacial Geology in St. Louis and Vicinity, Studies in. J. A. Drushel, 867*; Tongue of the Hasanabad Glacier in 1908. W. H. Workman, 225*; Kumdan Glaciers in 1902. Dr. S. Hedin, 225*; Notes on Certain Glaciers in Sikkim. T. H. D. LaTouche, 225*; Anciens glaciers de la Corse et les oscillations pleistocènes de la Méditerranée. R. Lucerna, 560*; Études récentes sur les glaciers du Dauphiné. C. Jacob, 73*; Sur la dernière période glaciaire en Europe et dans l'Amérique du Nord en rapport . . . cause de périodes glaciaires en général. N. J. Kriscshafowitsch, 317*; Some Effects of Glacial Action in Iceland. F. E. Wright, 478*; Glazialgeologische Studien über die rezenten und diluvialen Gletschergebiete Islands. H. Reck, 793*; Gletscherbeobachtungen in Selrain und nördlichen Stubai 1909. Dr. M. Lagally, 477* ¶ Maps of Glaciers: Glaciers du Massif des Grandes Rousses, 392*; Schéma des extensions glaciaires les plus récentes. C. Jacob, 393*; Kames of Maine and S. E. New Hampshire, 954*; Maps showing glaciated areas in North America and Europe, 959*;

- Glacial Geology of the region between the Elbe and Lübeck, 958*;
 Glacial Geology of the U. S. and Canada, *n.*, 954; Glacial Lake Agassiz showing its relation to Hudson Bay and the Great Lakes, 954*; Stages of recession of ice in Minnesota, 954*;
 Western New York showing distribution of morainal deposits, 954*;
 Sketch Map of Missouri Coteau and its Moraines. J. E. Todd, 955*; Übersichtskarte der Gletschergebiete von Island. H. Reck, 711*
 Glacier National Park, 366
 Glangeaud, Ph. Migration de la ligne de partage des eaux dans la chaîne des Puys, 638*
 Glenn, L. C. Denudation and Erosion in Southern Appalachian Region and Monongahela Basin, 635*
 Globus merged with *Petermanns Mitteilungen*, 138
Glossina palpalis. See Tsetse Fly.
 Goblet, Y. M., joint author, see Dr. G. Samné.
 Goës, Dr. K. Die indischen Grossstädte, 717*
 Goethals, Col. G. W. Panama Canal, 790*
 Goffin, L. Chemins de fer nationaux vers le Katanga, 153*
 Gold, Certain Natural Associations of. F. C. Lincoln, 953*
 Gold Coast: ¶Beitrag zur Kenntnis des Klimas von Salaga, Togo und der Goldküste. G. A. Krause, 950*;
 Mapping the — and Ashanti. Maj. F. G. Guggisberg, 791* ¶Map of the Gold Coast and Ashanti, *n.*, 78
 Gold, E., and W. A. Harwood. Upper Air, 479*
 Goldenweiser, A. A. Totemism, an Analytical Study, 398*
 Goldman, M. I. Colorado Springs Coal Field, 151*
 Goldthwait, J. W. Instrumental Survey of Shorelines of the Extinct Lakes Algonquin and Nipissing in S. W. Ontario, 949*; Raised Beaches of Southern Quebec, 949*
 Golf, Dr. Ackerbau in Deutsch-Südwestafrika, 637*
 Goodchild, T. Northeastern Cheh-kiang, China: Notes on Human Adaptation to Environment, 801
 Goode, J. P., Base Maps, *n.*, 712
 Gordon, C. E. Geology of Poughkeepsie Quad., 867*
 Gordon-Cumming, C. F. Via Cornwall to Egypt, 400*
 Görgény Mountains, Map of Part of, 958*;
 Geol. Kartenskizze der Mezö-havas Masse, 958*
 Gosiute Indians, Ethno-Botany of. R. V. Chamberlin, 788*, 867*
 Gottfried, J. L. Historische Kronyck. Grootlycks vermeerderd en Verbeeterd (1702), 720*
 Göttingen, Das geographische Seminar in. E. Harms and O. Kämpfer, 72*
 Götz, Prof. Wilhelm, *Obituary*, 529
 Götzen, Count Adolph von, *Obituary*, 59
 Göttinger, Dr. G. Bergstürze des Mai 1910 in der Umgebung von Scheibbs, 71*;
 Hafen von Mannheim, 871*
 Gould, C. N. Progress Geol. Map of Oklahoma, 796*
 Goulet, Col. Organisation militaire de l'Afrique Équatoriale, 395*
 Gouraud, Col. Pacification de la Mauritanie, 69*
 Goyaz, Lo Stato di. E. Axerio, 715*
 Gradmann, R. Getreidebau im deutschen und römischen Altertum, *n.*, 148
 Gräf, Dr. Biologie. Forschungsreise S. M. S. Planet, 1906-7, *n.*, 212
 Graians, Scrambles in the Eastern. G. Yeld, 320*
 Gran Chaco: Gran-Chako und die Pampas. W. Simon, 67*
 Grand Canyon of the Colorado: ¶History of — District. Prof. D. W. Johnson, 285; Single Cycle Development of — H. H. Robinson, 948*
 Grande, Rio — do Sul, Navegação na costa do. A. Alves Dos Santos, 715*
 Grant, M. Conditions of Wild Life in Alaska, 714*
 Grant, U. S. Mining and Prospecting on Prince William Sound, 1909, 151*;
 — and D. F. Higgins. Glaciers of Prince William Sound and the Southern Part of the Kenai Peninsula, Alaska, 321, 401, 721; Prel. Report on Mineral Resources of Southern Part of Kenai Peninsula, 151*
 Grasset, Capt. Journal du corps de débarquement de Casablanca à travers la Chaouia, 869*
 Gravier, G. Émancipation économique de la Serbie, 952*
 Gravity Determinations at Sea. L. A. Bauer, 399*
 Gray, C. J. Report of Mining Industry of Natal, 1909, 396*
 Gray's Harbor, Wash., Chart U. S. Coast and Geod. Surv., 76*
 Gray, W., and A. L. Halden. Minería de estaño en Bolivia, 950*
 Grayson Co., Tex., Soil Survey Map of, 158*

- Great Basin, Surface Water Supply of — 1909. E. C. La Rue and F. F. Henshaw, 635*
- Great Britain. — See also United Kingdom, Ireland and Scotland: ¶Ancient Britain and the Invasion of Julius Cæsar. T. R. Holmes, *rev.*, 142; Early Britain. Roman Britain. E. Conybeare, *n.*, 701
- Great Lakes: ¶Fur-Trade on the Upper Lakes, 1778-1815, 314* History of. F. Leverett, 52; Our Inland Seas. Shipping, Commerce, etc. J. C. Mills, *rev.*, 139; Outline of the History of. F. Leverett, 553* ¶Maps of Great Lakes: Map showing Preglacial Drainage in the Basin of Lower —, 954*; Meteorological Charts U. S. Weather Bur., 158, 229, 389, 632*
- Great Plains in their Relation to Human Occupation and Development. C. W. Hotchkiss, 635*
- Greatorex, E. Landmarks of Old New York, 236*
- Greece: ¶Classical Dictionary of the Greeks and Romans with account of coins, weights and measures, etc. C. Anthon, 320*; Distribution of Early Civilization in northern. A. J. B. Wace and M. S. Thompson, 871*; Greek Lands and the Greek People. Prof. J. L. Myres, 558*; Griechen und Bulgaren im neunzehnten und zwanzigsten Jahrhundert. Prof. N. Kasasis, *n.*, 144; Histoire de la civilisation hellénique. M. C. Paparrigopoulos, 400*
- Greenfield, W. H. Sketch Map of East Central Queensland. Gold Mineral and Coal Fields, 311*
- Greenland: ¶Bemerkungen über die geographische Lage der Niederlassungen in Westgrönland. M. C. Engell, 72*; Census of Danish —, 689; Disappearance of Ancient Icelandic Colony of, 920; Expédition danoise de Mylius Erichsen à la côte nord-est du Groenland. Lieut. Trolle, 559*; Meddelelser om Grønland, (Communications on Greenland). Vols. XLIII and XLVII, 560*; Terrestrial Mammals and Birds of Northeast —. A. L. V. Manniche, 59 ¶Maps of Greenland: Carte indiquant la position de l'Isthme unissant l'île Clavering au Continent (Côte orientale du Grönland), 712*; Nördliches Westgrönland, Südliches Westgrönland. M. C. Engell, 80*
- Greenland Sea, Oceanography of. D. Damas, 479*
- Green River Basin, Wyo., Weathering of Coal in Arid Region of. A. R. Schultz, 151*
- Greenwich Time Adopted in France, 289; Rapport sur la question du Méridien de — spécialement . . . au point de vue de la France. E. Nicolle, 73*
- Gregory, E. W., *joint author*, see H. P. Maskell.
- Gregory, H. E. San Juan Oil Field, Utah, 474*; Personal, 623; — and H. H. Robinson. Prel. Geol. Map of Connecticut, 954*; See also M. R. Campbell, *joint author*.
- Gregory, J. W. Terms "Denudation," "Erosion," "Corrosion," and "Corrasion," 399*
- Gregory, W. M. Geographical Equipment of the Cleveland Normal School, 453; Map Study in Schools, 452
- Grenard, F. Tibet, the Country and Its Inhabitants, 237*
- Grenfell, Dr. W. T. Labrador, 789*; Land of Eternal Warring, 222*; Personal, 294
- Grimshaw, B. The New New Guinea, *rev.*, 381
- Grinnell, G. B. Great Mysteries of the Cheyenne, 553*; See also J. Burroughs, *joint author*.
- Grinnell Land. Remarks on English Maps of Arctic Discoveries in 1850-51, etc. P. Force, 400*
- Gröber, P. Carbon and Carbonfossilien des nördlichen und zentralen Tian-Schan, *n.*, 66
- Groll, Dr. M. Unterseeische Gebirge, 640*
- Grothe, Dr. H. Geographische Charakterbilder aus der asiatischen Türkei und dem südlichen mesopot.-iranischen Randgebirge, *n.*, 65; Meine Expedition durch Vorder-Asien, 870*
- Grouner (G. S.). Histoire naturelle des glaciers de Suisse, traduction libre de l'allemand par M. de Kéralto (1770), 238*
- Grover, N. C., and R. H. Bolster. Hydrography of Virginia, 880*
- Grubauer, A. Gunung Si-Bajak, 638*
- Grubb, W. B. Unknown People in an Unknown Land. Account of Life and Customs of Lengua Indians of Paraguayan Chaco, etc., *rev.*, 458
- Grube, W. Religion und Kultur der Chinesen, *rev.*, 931
- Grund, Dr. A. Zur Frage des Grundwassers im Karst, 157*; Die italienisch-österreichische Erforschung des Adriatischen Meeres, 718*; Das Karstphänomen (Geol. Charakterbilder), *rev.*, 215
- Gruvell, Dr. A. Der Fischfang der

- Eingeborenen den Kolonien Westafrikas, 791*; Les pêcheries de la Côte d'Ivoire, 716*
- Grytriken (Süd-Georgien). [Whaling Station], 872*
- Guadeloupe: Statistique du Commerce . . . 1908, 789*
- Guagira, Peninsula de la (Map). F. A. A. Simons, 955*
- Guaira, La: Ferrocarril de — a Caracas. J. Flind, 636*; La Guaira the Picturesque. I. A. Manning, 153*; Plano para el Estudio de la Desviación de la Plomada en, 876*
- Guam. Comm. G. L. Dyer, 558*
- Guatemala: ¶Explorations in the Department of Peten. Tikal. T. Maler, 949*; Lakes of. E. F. Tisdell, 395*; Railroad Construction. E. F. Tisdell, 395*; Sculptures of Santa Lucia Cosumalwhuapa in —. S. Habel, 640*
- Gubbio, Past and Present. L. McCracken, 320*
- Guebriant, Mgr. de. Dans les rapides du Yalong (China), 70*
- Guérin-Ganivet, J. Notes préliminaires sur les Gisements de Mollusques comestibles des Côtes de France, 226*, 638*; Carte des Gisements de Coquilles comestibles de la Côte du Finistère, 392*, — del la Rade de Brest, 234*
- Gueudeville [Nicolas]. Atlas historique ou nouvelle Introduction à l'Histoire, etc., 720*
- Guggisberg, Maj. F. G. Mapping the Gold Coast and Ashanti, 791*
- Guiana, British: ¶Balata and Rubber Industries, 476*; Cacao and Coffee, Coconut, Lime, Rice and Timber Industries, 555*; Foundation and Development of —. J. A. J. Villiers, 950*; Storm van's Gravesande. The Rise of British Guiana compiled from his Despatches by C. A. Harris and J. A. J. de Villiers, 318*; Sugar Industry, 476* ¶Map to illustrate paper by J. A. J. de Villiers, 797*
- Dutch Guiana: ¶Explorations of Lieut. E. de Haan in, 136; Gold-industrie in Surinam. Dr. G. A. F. Molengraaf, 223*; Work of Exploration in, 525
- French Guiana: ¶Statistique du Commerce . . . 1908, 790*; Statistiques de l'industrie minière . . . 1908. Tableau général de l'industrie minière de 1900 à 1908, 868*
- Guild, Hon. C., Jr. Present Forestry Issues, 394*
- Guinea, French: ¶Achèvement du chemin de fer de la Guinée Française. Océan relié au Niger, 68*; Chemin de fer de la —. A. Arcin, 716*; Guinée Française: Chemin de fer et Progrès. E. Salesse, 154*; Notes sur la —, 476*; Statistiques de commerce . . . 1908, 869* ¶Maps of French Guinea: Carte du Pays Toma, 956*; Chemin de fer de Guinée et ses rapports économiques avec le Cours du Niger, 956*; Frontière Franco-Libérienne, 956*; Projet de délimitation en 1906 (between French Guinea and Liberia), 955*; Schéma des sources du Niger et du pays Toma, 955*
- Spanish Guinea: ¶Guinea española. A. Barrera, 951*; Territorios Españoles del Muni. E. López Perea, 224*
- Guiterman, F. On the Use, Non-Use and Waste of Mineral Resources of Colorado, 221*
- Gulf Stream: Unperiodische Temperaturschwankungen im Golfstrom und deren Beziehung zu der Luftdruckverteilung. J. Petersen, 317* ¶Map: Gulf Stream in the Gulf of Mexico showing Currents as they exist during Different Seasons. Lieut. J. C. Soley, Reverse Pilot Chart of North Atlantic Ocean, 632*
- Gulischambarov, S. Bevölkerung der Erde und ihre Verteilung nach dem Geschlecht, 559*
- Gunflint District, Ont. J. D. Trueman, 949*
- Gunung Si-Bajak [Sumatra]. A. Grubauer, 638*
- Guthe, Prof. Dr. Aufnahme des Ostjordanlandes durch den Deutschen Palästina Verein, 397*
- Gutiérrez de Santa Clara, P. Historia de las Guerras civiles del Perú (1544-1548), etc., n., 946
- Gutzlaff, C. Journal of Three Voyages along the Coast of China in 1831, 237*
- Guyer, G. A. Im Ballon über die Jungfrau nach Italien, n., 946


H.

- Haan, Lieut. E. Explorations in Dutch Guiana, 136
- Haanel, Dr. E. Possible Economies in Production of Minerals of Canada, 554*
- Haardt v. Hartenthurn, V. Hölzel's Wandkarte der Alpen auf Grundlage der Haardschen Karte. Dr. F. Heide- rich, n., 79; —. Hand und Reise- Karte der Alpen Länder, 234*
- Habel, S. Sculptures of Santa Lucia Cosumalwhuapa in Guatemala, 640*
- Habenicht, H. Spuren der Eiszeiten in

- Norddeutschland und Versuch ihrer Deutung, 71*
- Häberle, D. Der Pfälzerwald, 952*
- Haddon, A. C., and A. H. Quiggin. History of Anthropology, *rev.*, 543
- Hagen, Dr. B. Bericht über die von Dr. Elbert geführte Sundaexpedition, *usw.*, 224*
- Hague, Dr. A. Origin of Thermal Waters in Yellowstone National Park, 553*
- Hahn, F. Geographie auf der Naturforscherversammlung, 794*
- Hahn, P. D. A Geyser in South Africa, 717*
- Haiti: ¶ Developments in. H. W. Furniss, 475*; En Haiti. Planteurs d'autrefois, Nègres d'aujourd'hui. E. Aubin, *rev.*, 300
- Hakluyt, Richard. Reproduction of Tablet erected in Bristol Cathedral to the Memory of, 800*
- Halbfass, Dr. W. Ergebnisse neuerer simultaner Temperaturmessungen in einigen tiefen Seen Europas, 317*; Zur Kenntnis der Seen der Hohen Tatra, 477*; Wirtschaftliche Bedeutung der Binnenseen, 399*
- Halden, A. L., *joint author*, see W. Gray.
- Hale, A. Balsam of Peru, 790*; Yerba Maté-Paraguayan Tea, 639*
- Hales, J. G. Survey of Boston and Vicinity . . . with Topographic Sketches of the Country, 560*
- Haliburton and Bancroft Areas, Geology of. F. D. Adams and A. E. Barlow, 66*
- Hall, A. D. Fertility of the Soil, 72*
- Hall, C. W., O. E. Meinzer and M. L. Fuller. Map of Southern Minnesota showing Underground Water Conditions, 706*; Map of S. Minn. showing thickness and Character of Surface Deposits, 706
- Hall, E. H. English Version of Prof. Bacchiani's Giovanni da Verrazzano and His Discoveries in North America . . . Cellere Codex of Rome, 221*
- Hall, Lieut. F. Travels in France in 1818, 320*
- Hall, R. Distribution of Australian Land-Birds, 871*
- Hall, T. S. Notes on Geology of the Country about Anglesea, 397*
- Halley's Comet: ¶ Address on the Return of — in 1910. A. C. D. Crommelin, 399*; Did the Tail of — affect the Earth's Atmosphere? Dr. J. Aitken, 228*; Return of. W. W. Campbell, 479*
- Hallock, C. Caves and Ruins of Arizona and Colorado, 394*
- Halmahera, Celebes en —. E. C. Abendanon, 224*
- Halot, l'Île Formose, 225*
- Hamberg, Prof. Dr. A. Variations périodiques des glaciers, 1909. Suède, 559*
- Hamburg Geog. Society, German East Africa Expedition of the, 856
- Hamerton, Capt. A. E., *joint author*, see Col. Sir David Bruce.
- Hamilton, J. C. Prairie Province: Sketches of Travel from Lake Ontario to Lake Winnipeg, 400*
- Hamilton, L. Colonial Education in Germany, 398*; Cotton-Growing in German East Africa, 869*
- Hammond's Pocket Atlas of the World, *n.*, 880
- Hampton Roads, Va., Chart U. S. Coast and Geod. Surv., 875*
- Hamy, Dr. E. T. Voyage d'André Michaux en Syrie et en Perse (1782-1785), 870*
- Hanau, H. Drei Karten zur Ergänzung der Triaskarte. Slavakien, Galizien, Bukovina, *usw.*, 233*; Königreich Böhmen und Erzherz. Böhmen-Eger, (Map), 233*; Triaskarte der Habsburger Monarchie, *n.*, 233
- Hanbury, D. T. Sport and Travel in the North land of Canada, 236*
- Hancock, J. L. Nature Sketches in Temperate America, *rev.*, 863
- Handel-Mazzetti, Dr. H. Frh. v. Reisebilder aus Mesopotamien und Kurdistan, 557*
- Hanging Valleys. See under Valleys.
- Hankow-Canton and Hankow-Sechuan Railways. Emprunt pour les chemins de fer de, 951*
- Hann, J. Handbuch der Klimatologie. Klima der Gemässigten und Polarzonen, *rev.*, 935
- Hannah, I. C. Eastern Asia. A History, *rev.*, 943
- Hanover, Diluvium in der Umgebung von. K. Olbricht, 315* ¶ Map of Hanover: Altsächsische Bauernhaus in Umkreise der Stadt Hannover, 878*
- Hansard, Capt. A. C. Early Days in Japan, 717*
- Hardy, J. A. Picturesque and Descriptive Tour in the Mountains of High Pyrenees, *etc.*, 238*
- Hardy, Dr. M. Africa. Vegetation (Map), *n.*, 80
- Hardy, N. H., and E. W. Elkington. Savage South Seas, 400*
- Harfeld, Comm. F. Contributions à la géographie du Hou Nann, 870*

- Harford, Ch. F. Ratgeber für die Ausrüstung von Reisenden nach Übersee u. Tropen, *n.*, 216
- Haring, C. H. Buccaneers in the West Indies in the XVIIth Century, *rev.*, 457
- Harms, E., and O. Kämpfer. Geographische Seminar in Göttingen, 72
- Harper, L. F. Geology of the Murrumbidgee R. District, near Yass 477*
- Harper, R. M. Early Spring Aspects of Coastal Plain Vegetation of South Carolina, Georgia and N. E. Florida, 948*; Hempstead Plains, Natural Prairie on Long Island, 351; Quantitative Study of the more Conspicuous Vegetation of Certain Natural Subdivisions of the Coastal Plain, 66*, 553*; Summer Notes on Mountain Vegetation of Haywood Co., N. C., 66*; Wire-Grass Country of Southern Georgia, 522
- Harris, C. A., and J. A. J. de Villiers. Storm van's Gravesande. The Rise of British Guiana compiled from his despatches, 318*
- Harris, G. D. Oil and Gas in Louisiana with Brief Summary of their Occurrence in Adjacent States, 66*
- Harris, L. With Mulai Hafid at Fez, *rev.*, 459
- Harris, R. A. Arctic Tides, 202; Cotidal Lines for Arctic Regions (Map), 312*
- Harris, W. T. Erie Michigan Canal, 960*
- Harrar: Reise nach — und Adis Ababa. F. J. Bieber, 67*
- Hartmeyer, Dr. R. Ascidien der Deutschen Südpolar Expedition, 1901-3. Zoologie, 800*
- Hartshorne, A. C. Japan and Her People, 237*
- Hartz Mountains, Saxon, Switzerland, Rambles in. H. C. Andersen, 400*
- Harwood, W. A., *joint author*, see E. Gold.
- Hasanabad Glacier, Tongue of the — in 1908. Dr. W. H. Workman, 225*
- Hasluck, F. W. Cyzicus. Account of History, Antiquities . . . and Adjacent District, etc., *n.*, 930
- Hassel, J. M. von. Croquis de la Ciudad de Iquitos y sus Alrededores, 634*
- Hassert, Dr. K. Die räumliche Entwicklung Montenegros, 315*
- Hassinger, Dr. H. Über Aufgaben der Städtekunde, 316*; Geographische Verbreitung der Grossstädte, (Map), *n.*, 552
- Hassler, Dr. E., *joint author*, see Dr. R. Chodat.
- Hastings, J., J. A. Selbie and Others, *Editors*. Encyclopædia of Religion and Ethics, Vol. III, 320*
- Hatch, F. H. Catalogue of Collection of Rocks and Minerals from Natal and Zululand arranged stratigraphically, 555*
- Hausaland, From — to Egypt, through the Sudan. H. K. W. Kumm, *rev.*, 535
- Hauser, H., *joint author*, see H. Busson and J. Fèvre.
- Hausermann, R. Brazil segundo os mais recentes Trabalhos, 876*; Église catholique dans les Balkans (maps), 551*
- Haute-Loire et le Haut Vivarais. M. Boule, *n.*, 947
- Hautes-Pyrénées. Picturesque and Descriptive Tour in the Mountains of the High Pyrenees. J. A. Hardy, 238*
- Hauthal, Prof. Dr. R. Bismarck-Gletscher, ein vorrückender Gletscher in der patagonischen Cordillere, 476*
- Hautle-Hättenschwiller, Dr. A. Stand der schweizerischen Binnen-Schifffahrtsfrage, 478*
- Hautreux, A. Températures de l'Atlantique Nord (Surface et Profondeurs), 640*
- Havel and Elbe Junction: Havelwinkel, Lage der Siedlungen, *n.*, 234
- Havre, Agrandissement du — avant-port de Paris. L. Berthaut, 638*
- Hawaii, Territory of: ¶Hawaii and Its Volcanoes. C. H. Hitchcock, *rev.*, 210; Results of Observations made at Coast and Geod. Surv. Magnetic Observ. near Honolulu, 1907-8. D. L. Hazard, 870*; Volcanoes of Kilauea and Mauna Loa. W. T. Brigham, *n.*, 141 ¶Maps of Hawaii: Hawaiian Islands. Gen. Progress Sketch, Rep. 1909-10, 470*; Kahului Harbor and Approaches, Island of Maui, 76*
- Hawes, A. F. State Ownership of Forests, 553*
- Hayden, A. L. Riders of the Plains. Adventures . . . North-West Mounted Police, *rev.*, 61
- Hayden, H. H. Some Coal-fields in north-eastern Assam, 477*
- Hayes, Dr. C. W., Personal, 921
- Hazard, D. L. Directions for Magnetic Measurements, 867*; Results of Observations made at the Coast and Geod. Sur. Magnetic Observ. at Cheltenham, Md., 635*; — near Honolulu, 1907-8, 870*; — at Sitka, 1907-8, 867*
- Heath River. Maj. P. H. Fawcett, 555* ¶Map of Heath R. and Ad-

- jacent Territory. Maj. P. H. Fawcett, 391*
- Heaton's Annual. Commercial Handbook of Canada, etc., *n.*, 544
- Heawood, E. Claudius Clavus and the Early Geography of the North, 228*
- Heber, R. Narrative of a Journey through the Upper Provinces of India, from Calcutta to Bombay, 1824-1825, 319*
- Hebrides, From — to the Himalayas. Sketch of Wanderings in Western Isles and Eastern Highlands. C. F. G. Cumming, 320*
- Heckenroth. Rapport sur le fonctionnement du laboratoire de Brazzaville depuis 1906, 791*
- Hedin, Sven. Central Asia and Tibet, 237*; Le Désert de Lop à la lumière des récentes explorations, 791*; Kundaan Glaciers in 1902, 225*; Personal, 692
- Hedley, J. Tramps in Dark Mongolia, *rev.*, 209
- Heiderich, Dr. F. Hölzel's Wandkarte der Alpen auf Grundlage der V. v. Haardtschen Karte, *n.*, 79
- Heidke, Dr. P. Meteorologische Beobachtungen aus Deutsch-Ostafrika, 154*
- Heim, A., *joint author*, see E. Buss.
- Heinly, B. A. Carrying Water Through a Desert, Story of the Los Angeles Aqueduct, 221*
- Hellman, Dr. G. Über die extremen Schwankungen des Regenfalls, 73*
- Helps, A. Spanish Conquest of Mexico, and its Relation to the History of Slavery, etc., 318*
- Hempstead Harbor, L. I., Chart U. S. Coast and Geod. Sur., 545*
- Hempstead Plains. Natural Prairie on Long Island. R. M. Harper, 351
- Hennepin at the Falls of St. Anthony. N. H. Winchell, 714*
- Hennig, C. L. Streifzüge in den Rocky Mountains, 474*
- Hennig, Dr. R. Geographie und Verkehrswissenschaft, 794*; Russische Grossschiffahrtswege, 871*; Unternehmen der panamerikanischen Bahn, 313*
- Henrici, Capt. E. O. Height of Ruwenzori, 918
- Henry, J. D. Oil Fields of the Empire. Survey British Imperial Petroleum, etc., *rev.*, 148
- Henry of Portugal, Prince—and the African Crusade of Fifteenth Century. C. R. Beazley, 317*
- Henshaw, F. F. Mining in Seward Peninsula, 474*; see also E. C. La Rue, *joint author*.
- Herbermann, C. G., *Editor*. Catholic Encyclopedia. Vol. IX, 240*, Vol. X, 400*
- Herbertson, A. J. Oxford Geographies. Vol. III. Senior Geography, *n.*, 149; Physiographical Introduction to Geography, *n.*, 219
- Herculaneum, Buried —. E. R. Barker, *rev.*, 220
- Hermann, Dr. R. Transkontinentale Bahnen und die Kap-Kairo-Linie, 153*
- Hermannstadt, Geol. Übersichtskarte der Umgebung von, 957*
- Herrin, W. E. Water Powers in Northwest, 221*
- Herring, Report on — Investigations until Jan., 1910. J. Hjort, 559*
- Herzegovina and Bosnia: Bosnia-Erzegovina sotto l'aspetto storico, giuridico et economico. G. Giacchi, 157*; Grunds Studien zur Morphologie und Morphogenese der Herzegovina. N. A. Krebs, 638*
- Herzog, Dr. T. Explorations in Bolivia, 525
- Hess, F. L. Rare Metals, 789*
- Hesse, Dr. H. Finanzielle Entwicklung Kameruns, 153*
- Hessen, Beiträge zur Statistik des Grossherzogtums, 227* ¶ Map of: Übersichtskarte des Grossherzogthums, 798*
- Hettner, Dr. A. Arbeit des fließenden Wassers, 317*; Terminologie der Oberflächenformen, 640*; Wüstenformen in Deutschland, 315*
- Heusler, J. J. Region Salitrera de Chile comprendida entre El Toco i Copiapó (Map), *n.*, 797
- Heungchow, Chart of newly established Port of — and Surrounding District, 231*
- Hevea brasiliensis*. See Para Rubber.
- Hewitt, C. G. Conservation, or the Protection of Nature, 789*
- Hickman, Prof. A. L. Geographisch-statist. Taschen-Atlas von Österreich-Ungarn, *n.*, 80
- Hidalgo y Costilla, Miguel. Life and Times of —. A. H. Noll, *rev.*, 374
- Hietzing-Umgebung, Karte der politischen Bezirke —, *n.*, 233
- Higgins, D. F., *joint author*, see U. S. Grant.
- Himalayas: ¶ Call of the Snowy Harper. Narrative of Exploration and Mountaineering. W. H. Workman, *rev.*, 929; Five Months in —. A. L. Mumm, 319*; From Hebrides to the

- Himalayas. Sketch of Wanderings in Western Isles and Eastern Highlands. C. F. G. Cumming, 320*; Survey of. Dr. T. G. Longstaff, 396*, 638*.  Map of Himalayas: Sketch Map to illustrate explorations of Dr. A. Neve, 957*
- Hinds, H., *joint author*, see C. T. Lupton.
- Hinks, A. R. Progress in Geodesy, 530
- Hintze, A. Beiträge zur Petrographie der älteren Gesteine . . . Kamerun, 555*
- Hispar, Les fronts des glaciers de Yengutsa et d'—. Dr. C. Calciati, 477*; The Call of the Snowy —, etc. W. H. Workman, *rev.*, 929
- Historical Geography. See under Geography.
- Hitchcock, Prof. C. H. Hawaii and its Volcanoes, *rev.*, 210; Personal, 294, 529
- Hjort, J. "Michael Sars" in North Atlantic Deep-Sea Expedition, 1910, 720*; Report on Herring Investigations, 559*
- Hobbs, W. H. Characteristics of Existing Glaciers, *rev.*, 934; Ice Masses on and about the Antarctic Continent, 398*; Pleistocene Glaciation of North America viewed in the Light of our Knowledge of Existing Continental glaciers, 641; Repeating Patterns in the Relief and the Structure of the Land, 719*; Requisite Conditions for the Formation of Ice Ramparts, 719*; Study of Damage to Bridges during Earthquakes, 74*
- Hochalmspitzgruppe, Karte der Ankogel —. Dr. E. Stummer, 233*
- Hochreutiner, Dr. B. P. G. Remarques sur la géographie botanique de Madagascar, 69*
- Höck, Dr. F. Zur Verbreitung einiger Nutzpflanzen, 952*
- Hodge, F. W. The Jumano Indians, 221*
- Hodson, F., *Editor*. Broad Lines in Science Teaching, *rev.*, 464
- Hoebel's Karte von China, *n.*, 232*
- Hoffer, Dr. M. Unterirdisch entwässerte Gebiete in Innerbosnien, 638*
- [Hoffman, C. F.] Winter in the West, 560*
- Hogg, T. J. Two Hundred and Nine Days; or, The Journal of a Traveller on the Continent, 239*
- Hokkaido, Map showing Relation of Volcanic and Seismic Phenomena in West —, 797*
- Hole, H. M. Agricultural Labor Conditions in Southern Rhodesia, 476*
- Hollick, A. Results of Prel. Study of so-called Kenai Flora of Alaska, 553*
- Holmes, J. S. Forest Fires and their prevention, etc., 960*
- Holmes, T. R. Ancient Britain and the Invasions of Julius Caesar, *rev.*, 142
- Holmes, W. H. Some Problems of the American Race, 151*
- Holty-Camagüey, R. J. Die Zuckerrohrkultur und Zuckerindustrie auf Cuba, 67*
- Holway, R. S. Extension of the Known Area of Pleistocene Glaciation to the Coast Ranges of California, 161; Topographic Environment of San Francisco, 789*
- Holzmann, M. Syrische Städtebilder. Aleppo, 717*
- Homburg, F. The Volga, 227*
- Honda, K., *joint author*, see S. Nakamura.
- Honduras: New Chapter in the History of, 949*; Notes on. R. H. Toll, 789*; Recent Discoveries in. A. H. Blackiston, 475*
- Hone, J. M., and P. L. Dickinson. Persia in Revolution, *rev.*, 462
- Hong Kong, Crime and Government at. T. C. Anstey, 236*
- Hooker, A., *Editor*. Official Proceedings of the Eighteenth National Irrigation Congress, *n.*, 218
- Hopkinson, Dr. E. Agricultural Labour Conditions in Gambia Protectorate, 556*
- Horton, A. H., *joint author*, see C. C. Covert and R. Follansbee.
- Hosseus, Dr. C. C. Reisbau in Siam, 870*
- Hotchkin, J. H. History of Purchase and Settlement of Western New York and Rise, Progress . . . Presbyterian Church in that Section, 236*
- Hotchkiss, C. W. Great Plains in Their Relation to Human Occupation and Development, 635*
- Hot Springs, Ark., Collecting Area of Waters of the hot springs in —. A. H. Purdue, 151*
- Hotz-Linder, Dr. R. Schweizer Schulkartographie, 871*
- Howarth, O. J. R. Geography of Ireland, *n.*, 866
- Howe, H., *joint author*, see J. W. Barber.
- Howell, Edwin E., *Obituary*, 624
- Hoyt, J. C. Water-Power Reconnaissance in S. E. Alaska, 474*
- Hrdlička, Dr. A. Some Results of Recent Anthropological Exploration in Peru, 619

- Huber, R. Empire Ottoman. Carte statistique des cultes chrétiens, *n.*, 312
- Hubert, H. Populations géophages de l'Afrique Occidentale, 716*; Le Relief de la Boucle du Niger, 716*
- Hudson Bay Region. Across Sub-Arctics of Canada. Journey of 3,200 miles by Canoe and Snowshoe through the —. J. W. Tyrrell, 319*; — Drainage Basin. R. Follansbee, A. H. Horton and R. H. Bolster, 867*; Hudson Bay Railway, 152*; — Route, 949*; Mediterranean of the North. Hudson Bay and its Coasts. New Route to Wheatfields, 152*
- Hudson Land. E. S. Balch, 445
- Hudson R.: From the Hudson to the Ohio. W. B. Wilson, 720*
- Hugershoff, Dr. Periodischen Fehler barometrisch bestimmter Höhenunterschiede in inneren Tropenzone, 73*
- Hughes, Mrs. T. F. Among the Sons of Han. Notes . . . Residence . . . China and Formosa, 237*
- Hulot, Baron. Coup d'œil sur les explorations françaises en Afrique au début du XX^e siècle, etc., 869*
- Humboldt, A. von. Cosmos: Sketch of Physical Description of the Universe, 320*
- Humphreys, W. J. Levels of Maximum and Minimum Cloudiness, 953*; Origin of Permanent Ocean Highs, 953*
- Hunan: ¶Contributions à la géographie du Hou-Nann. Comm. F. Harfeld, 870*; Effort scolaire au Hounan, 156* ¶Map: Itinéraire du Capitaine Harfeld . . . en 1903-4, 708*
- Hungarian Self-Taught. Thimm's System, etc. A. Count de Soissons, *n.*, 149
- Hungary. See also Austria-Hungary: ¶Développement de la Hongrie. G. Blondel, 792*; Petroleum Investigations in — and Rumania, 859 ¶Maps of Hungary: Geographische Verteilung der Gewitter in Ungarn, *n.*, 957; Geol. Karte des Zjargebirges, 879*; Geol. u. Top. Skizze des Zempléner Klippengebirges, 958*; Geol. Kartenskizze de Mezöhasz Massé, 958*; Geol. Übersichtskarte der Umgebung von Hermannstadt, 957*; Map of part of Görgény Mountains, 958*; Staatsrechtliche Karte des Ungarischen Reiches, *n.*, 957*; Tektonische Skizze des Zjargebirges und der angrenzenden Gebiete, 879*; Top. Kartenskizze des Zempléner Klippengebirges, 958*; Verbreitungsgebiet der deutschen Sprache im Südungarn. Dr. R. v. Pfaunder, 878*
- Hunsberg, Erkundung der. Leut. Drews, 396*
- Hunt, A. S. Oxyrhynchus Papyri. Part VIII. Edited with translations and notes by —, 880*
- Hunt, H. A. Rainfall of New South Wales, 527
- Hunter, Capt. F. F., Personal, 861
- Huntington Bay L. I. Sound, Chart U. S. Coast and Geod. Surv., 309*
- Huntington, E. Burial of Olympia, 398*; Fringe of Verdure Around Asia Minor, 70*; Karst Country of Southern Asia Minor, 91; Palestine and its Transformation, *rev.*, 461; Physical Environment as a Factor in the Present Condition of Turkey, 719*; —'s Work in Southwest U. S., 195
- Hurn, E. A. Wisconsin Women in the War between the States, 880*
- Hurst, C., The Book of the English Oak, *n.*, 944
- Hutchinson, H. N. The Story of the Hills. Popular Account of Mountains and How They were Made, 239*
- Hutereau, Lieut. A. Les Bakango, 314*; Documents ethnographiques congolais: Manyanga, Mafoto, 68*
- Hutter, D. Im Gebiet der Etoshapfanne, 69*
- Hydrographic Offices: ¶Bulletin hydrographique pour l'Année Juillet 1908-Juin 1909, (Bureau Conseil Permanent Intern. pour l'Exploration de la Mer), 74* ¶Germany: Neuere ozeanographische Arbeiten der Deutschen Marine . . . Seewarte. Dr. G. Schott, 74*; Tabellarische Reiseberichte nach den meteor. Schiffstagebüchern, 74* ¶Japan: Seven Maps of Japanese lakes, 550* ¶Russia: Charts of Russian Coasts, 798*; Siberian Coasts, 799* ¶United States: General Catalogue of Mariners' Charts and Books, 314*; Skeleton or Plotting Charts. Lieut. R. Stone, 635*; Pilot Charts of North Atlantic Ocean, 76, 158, 229, 309, 389, 470, 545, 632, of the South Atlantic Ocean, 158, 470,* — of the North Pacific Ocean, 158, 229, 309, 389, 470,* — of the South Pacific Ocean, 158, 229, 470*
- I.
- Ibn G'ubayr. Viaggio in Ispagna, Sicilia, Siria, Palestina . . . nel Secolo XII. Prima Traduzione . . . da C. Schiaparelli, *rev.*, 216
- Icebergs: Über die Entstehung der Eisberge. M. C. Engell, 399*
- Iceland: Beobachtungen am Longjökull und im Thorisdalur. L. Wunder,

- 226*; Concise Dictionary of Old Icelandic. G. T. Zoëga, *n.*, 213; Some Effects of Glacial Action in. F. E. Wright, 478*; Glazialgeologische Studien über die rezenten und diluvialen Gletschergebiete Islands. H. Reck, 793*; Meine vierte Islandreise, 1910. H. Erkes, 226*; Physiographical Features of. W. S. C. Russell, 489; Le voyage de M. H. Stoll à travers l'Islande, 793* ¶ Map of Iceland: Übersichtskarte der Gletschergebiete von Island. H. Reck, 711*
- Ice Ramparts, Requisite Conditions for the Formation of. W. H. Hobbs, 719*
- Ice, River: Gliederung der Flusseises und die Arten seiner Erscheinungen, 318*
- Idaho: ¶ Gas and Oil Prospects in Payette. C. W. Washburne, 474*; White Pines of — and Montana. Their Distribution, Quality and Uses. F. I. Rockwell, 867* ¶ Maps of Idaho: Geol. Maps of Upper St. Joe R. Basin. J. T. Pardee, 874*; Subletts Mts., Wyo. and Adjacent Portions of Idaho, 229*; Sulphur-Bearing Area near Soda Springs, 544; Map showing extent of Phosphate Reserve, 229*; Prel. Map and Structure Section of Georgetown Canyon Phosphate Area, 229*; Reconnaissance Sketch Map of Prospective Gas and Oil Fields near Vale, Ore. and Payette, Idaho, *n.*, 630; Top. Survey Meadows Quad., 873*, Pullman Quad., 308*
- Ihering, H. v. Revista do Museu Paulista. Vol. VIII, 960*
- Ile d'Yeu à travers les âges, d'après la géologie, la cartographie et l'histoire. A. Pawlowski, 718*
- Ilg, A. Zur Geschichte der äthiopischen Eisenbahnen, 67*
- Illinois: ¶ Elizabeth Sheet of Lead and Zinc District of Northern. G. H. Cox, 553*; Geology and Mineral Resources of St. Louis Quad. N. M. Fenneman, 788*; Oil Fields in 1910. R. S. Blatchley, 394*, 635*; Oil Investigations in. R. S. Blatchley, 788*; Oil Resources of. R. S. Blatchley, 474*; Sketch of G. R. Clark's Campaign in — 1778-9, 400*; State Geological Survey of. F. D. De Wolf, 916; Studies of — Coal, 635*; Structural Materials in. J. A. Udden and J. E. Todd, 474*; Year-Book for 1909. Illinois State Geol. Sur., 715* ¶ Maps of Illinois: Carlyle, Hardinville, Murphysboro and Okawville Quadrangles, 75*; Geol. Map of the St. Louis Quad., 544*; Hennepin Quad., 629*; La Salle Quad., 873*; Map to show Oil Fields, Cross-Section Lines, etc., 546*
- Illinois R. Drainage Basin. R. Follansbee, A. H. Horton and R. H. Bolster, 948*
- Ilokono Dialect: *Iti Dalan Ti Santa Nga Kruz* (The Way of the Holy Cross). Edited and compiled by F. C. Meredith, 880*
- Imfeld, X., et L. Kurz. Carte Albert Barbey. Chaîne du Mont-Blanc, *n.*, 551
- Imola, Pianta d'—Facsimile of MS. map by Leonardo da Vinci, 799*; Pianta Topografica della Città d'Imola [modern, added for comparison], 799*
- Incas, Land of the. Sir Clements R. Markham, 153*
- Indexes. See also Bibliography and Catalogues. ¶ The Annual Library Index for 1910. Edited by W. I. Fletcher and others, 560*; Egypt Exploration Fund. General Index to Archaeological Reports. Vols. I-XVIII. W. L. Nash, Compiler, 960*; General Index to Publications of California State Mining Bureau. L. E. Aubury, 960*
- L. E. Aubury, 960*
- India: ¶ Descriptive: Among Indian Rajahs and Ryots. Sir Andrew H. L. Fraser, *n.*, 538; Dawn in Toda Land. C. F. Ling, *n.*, 305; Les fronts des glaciers de Yengutsa et Hispar. Dr. C. Calciati, 477*; Indian Alps and How We Crossed Them. By a Lady Pioneer. [N. E. Mazuchelli], 237*; Die indischen Grosstädte. Dr. K. Goës, 717*; L'Inde Britannique. Société indigène-Politique indigène, etc. J. Chailley, *rev.*, 207; Lord Curzon's Administration of India. Syed Sirdar Ali Khan, *rev.*, 783; Les musulmans de l'Inde et le nationalisme hindou. H. Marchand, 638*; Narrative of a Journey through the Upper Provinces of India, from Calcutta to Bombay, 1824-1825. E. Heber, 710*; Sixty Days Marching through Ladak and Lahoul. Mrs. A. Schuster, 717*; On the Study of Indian Architecture. J. Fergusson, 239*; From Tonkin to India by the Sources of Irawadi. Prince Henri d'Orléans, 237*; Traveler's Notes, or, Notes of a Tour through India, Malaysia, etc., 1891-93. J. H. Veitch, 240*; Über das Verhältnis der Geschlechter in Indien. R. Kirchhoff, 225*, *n.*, 305; Village, Town, and Jungle Life in India. A. C. Newcombe, 319* ¶ Economic: L'Inde. Sa condition actuelle. E.

- Clavery, *rev.*, 207; Indian Coal Output and Trade, 951*; Industrial Development in India. R. E. Forrest, 477*; Mineral Production during 1909. T. H. D. La Touche, 225*; Wirtschaftliche und politische Lage in British-Indien. F. W. Bickel, 870* ¶Historical: English Factories in, 1634-1636. W. Foster, 560*; History of India, from Earliest Times to the Present Day. L. J. Trotter, 319*; Illustrated History of British Empire in India, and the East from Earliest Times to . . . Sepoy Mutiny in 1859. E. H. Nolan, 319*; Tibetan Invasion of — in 647 A. D. and Its Results. L. A. Waddell, 396*; Records of Intelligence Department of the Government N. W. Provinces during Mutiny of 1857. W. Coldstream, *Editor*, 236* ¶Government Reports: Extracts from Narrative Reports of Officers of Survey of India, 1908-9. Magnetic Survey, Tidal and Leveling Operations, Pendulum Operations, Triangulation in, 800*; General Report on Operations of Survey of — 1908-09. Col. F. B. Longe, 396*; — on Geol. Survey for 1909. T. H. D. LaTouche, 225*; Catalogue of Maps published by the Survey of, 800* ¶Maps of India: Chart Illustrating Tibetan Invasion of Mid-India in 647 A. D. L. A. Waddell, 310*; Sketch to illustrate a journey into Abor Country. Col. D. M. Lumsden and N. Williamson, 709*; Stations of Observation of the Magnetic Survey, 160*; Verhältnis der Geschlechter in Indien, *n.*, 310; Volksdichte in der Oberen Gangesebene, etc. P. Böllert, *n.*, 472
- French India: Statistiques du Commerce . . . 1908. Établissements français dans l'Inde, 792*
- Portuguese India: Itinerario Voyage ofte Schipvaert van Jan Huygen van Linschoten naer oost ofte Portugaels Indien 1579-1592. Dr. H. Kern, *Editor*, 951*
- Indian Archipelago. See Malay Archipelago.
- Indiana: ¶Physiographic Survey of an Area near Terre Haute. C. R. Dryer and M. K. Davis, 113*; Stratigraphy and Coal Beds of Coal Field. G. H. Ashley, 221*; Underground Waters of North-Central. S. R. Capps, 714* ¶Maps of Indiana: Bloomington Quad, 75*; Clay City Quadrangle, 308*; Map of N. C. Indiana, showing Artesian Well Areas, 157*
- Indian Ocean. Meteorological Charts of the, 158, 229, 309, 389, 632*
- Indian Ocean, Islands of: South-West Indian Ocean. (Account of Aldabra and Neighboring Islands . . . not explored by Prof. J. S. Gardiner). J. C. F. Fryer, 316*
- Indian, Pacific and Atlantic Oceans: Forschungsreise S. M. S. Planet, 1906-7. Dr. W. Brennecke, Dr. Graf, and Dr. A. Krämer, *n.*, 212
- Indians, American: Chippewa Music. F. Densmore, 474*; Chumash and Costanoan Languages. A. L. Kroeber, 221*; Ethno-Botany of the Gosiute Indians. R. V. Chamberlin, 788*, 867*; Great Mysteries of the Cheyenne. G. B. Grinnell, 553*; Handbook of American Indians Languages, 367; Indian Tribes of the Lower Mississippi Valley and Adjacent Coast of the Gulf of Mexico. J. R. Swanton, 789*; Indian Languages of Mexico and Central America, and Their Geographical Distribution. C. Thomas and J. R. Swanton, 868*; Iroquois Uses of Maize and other Food Plants. A. S. Parker, 714*; Jumanó Indians. F. W. Hodge, 221*; Myths and Legends of the Pacific Northwest. K. B. Judson, *rev.*, 373; Myths of the Uintah Utes. J. A. Mason, 221*; Old North Trail; or Life, Legends and Religion of the Blackfeet Indians. W. McClintock, *n.*, 533; Origin of Iroquois Silversmithing. A. C. Parker, 394*; Republic of Panama and its People, with Special Reference to the Indians. E. Y. Bell, 314*; Shasta Myths. R. B. Dixon, 394*; Siriono-Indianer in Ostbolivien. E. v. Nordenskiöld, 395*; The Snake Dance. M. L. Oliver, 714*; Unknown People in an Unknown Land. Account of Life and Customs of the Lengua Indians of Paraguayan Chaco, etc. W. B. Grubb, *rev.*, 458 ¶Map: Indian Tribes of the Lower Mississippi and Adjacent Gulf Coast. John R. Swanton, 633*
- Indies, East. See East Indies.
- Indies, West. See West Indies.
- Indo-China, French: ¶Enseignement aux indigènes, *n.*, 149; L'Indo-Chine Française. L. Faque, *n.*, 376, —. H. Russier et H. Bernier, *rev.*, 931; De Saigon à Singapour, par Angkor autour du Golfe de Siam. Com. E. Lunet de Lajonquière, 225*; Situation économique, 951*; Statistique du Commerce,

- 1908, 798*; Statistique de l'Industrie minière, 1908, 792*; Exploitation de la houille, 870* ¶ Maps of French Indo-China: Carte économique et administrative, *n.*, 956*; Carte physique, *n.*, 956*; Indo-Chine française, 877*
- Indonesian Languages: Gemeinindonesisch und Urindonesisch. R. Brandstetter, 720*
- Industry and Commerce, Climate as related to —. J. F. Chamberlain, 317*; Some Factors influencing the Location and Migration of Industries. Prof. W. S. Tower, 639*
- Inness, R. T. A. Climate and Rainfall of South Africa, 197
- Innsbruck, Föhn Wind at, 621
- International Arbitration, Report of the Sixteenth Annual Meeting of Lake Mohonk Conference on. L. D. Powers, 318*
- International Year Book, The New —. Compendium of World's Progress for 1910, 640*
- Iowa: Results of Spirit Leveling in — 1896 to 1909. R. B. Marshall, 867*
- Iquitos, Croquis de la Ciudad de — y sus Alrededores. J. M. von Hassel, 634*
- Irak-Arabi: Die künstliche Bewässerung Babylonien. K. Ch. Christensen, 155*
- Irawadi, From Tonkin to India by the Sources of. Prince Henri d'Orléans, 237*
- Ireland. See also United Kingdom: ¶ Commerce de l'Irlande avec les pays étrangers. J. P. Boland, 478*; On Distribution of Mean Annual Rainfall . . . Area Including Counties of Dublin, Wicklow, etc. W. J. Lyons, 398*; Geography of Ireland. O. J. R. Howarth, *n.*, 866; Impressions d'Irlande. A. Demangeon, 872*; Irlande industrielle. Sir Walter Richard Nugent, 227* ¶ Map of Ireland: Map of Mean Annual Rainfall over Area including Counties of Dublin, Wicklow, Meath and Kildare, 234*
- Iroquois: Origin of — Silversmithing. A. C. Parker, 394*; Uses of Maize and other Food Plants. A. S. Parker, 714*
- Isachsen, G. Eisverhältnisse an den Küsten Spitzbergens sowie im Ost- und Westeise 1910, 719*
- Isar, Tölz und — landschaft. J. Jaeger, 315*
- Island, Formation of an — on Ögel Lake due to buoyancy of gases, 623
- Isle-Dieu. See Ile d'Yeu.
- Italy: Appennino settentrionale e centrale. F. Sacco, 793*; *Boll. delle Pubblicazioni ital.* Ricevute per Diritto di Stampa, 398*; Distribuzione geografica della robustezza in Italia. R. Livi, 793*; Guide to Italy and Sicily, *n.*, 785; Il VII Congresso Geog. Italiano, 478*; Movimento della Popolazione . . . 1908, 316*; Riforme urgenti per la geografia nelle Università Italiane. G. Dalla Vedova, C. Bertacchi and Others, 952*; Terrazze orografiche dell'alto Picentino a nord-est di Salerno. A. Galdiari, 603; Val di Comino o Cominese. Prof. R. Almagià, 639*; Une Vallée tectonique. Doire Baltée en aval d'Aoste. E. Argand, 478*; Variations périodiques des glaciers. Alpes italiennes. Prof. O. Marinelli, 478*; Voyage pittoresque en Suisse et en Italie. J. Cambry, 238 ¶ Economic: Commercio e l'industria dei prodotti forestali in. Prof. G. Assereto, 227*; Aus dem italienischen Marken. Dr. E. Schmidt, 398*; Studien über den Hanfbau in Italien. Dr. W. F. Bruck, 719*, 793*; Relazione sui servizi dell'emigrazione per l'anno 1909-10, 719*; Statistica della Emigrazione . . . 1908 e 1909, 316* ¶ Maps of Italy: Carta fisico-politica delle 69 Province Amministrative, etc., *n.*, 393; Carta d'Italia, *n.*, 311; Carta Politico-Amministrativa del Regno d'Italia colle linee ferroviarie e di navigazioni, *n.*, 393; Goode's Base Map, *n.*, 712; Schizzo geotettonico dello Appennino settentrionale e centrale, secondo i rilevamenti geol. di F. Sacco, 311*; Three Sections of the Map of Italy showing different Editions together with Plates of Conventional Signs, *n.*, 960
- Ivory Coast: Boundary between Liberia and —, 855; Pacification de la Côte d'Ivoire, 154*; —. E. Dupuy, 396*; Littoral et les lagunes de la —. G. Joseph, 950*; Pêcheries de la Côte d'Ivoire. A. Gruvel, 716*; Statistiques du Commerce . . . 1908, 556*
- Ivory Islands in the Arctic Ocean. Rev. D. G. Whitley, 398*
- Ixmiquilpan, Croquis geologico y topográfico del Valle de (map), 231*
- Izard, A. Exploitation de l'Alfa et les ressources naturelles dans l'Annexe d'El-Aricha, 476*
- J.
- Jaccard, Dr. P. Nouvelles recherches sur la Distribution florale, 74*
- Jacob, C. Études récentes sur les glaciers du Dauphiné, 73*; Schéma des extensions glaciaires les plus récentes

- dans le Massif des Grandes Rousses, 393*; Schéma orogr. et hydrogr. du Massif des Grandes Rousses, 393*
- Jaeger, F. Allerlei Beobachtungen über Schnee und Zackenfirn, 479*; Das Hochland der Riesenkrater und die umliegenden Hochländer Deutsch-Ostafrikas, Teil I, 716*; Wesen und Aufgaben der kolonialen Geographie, 953*; — and W. Rux. Abflusslose Rumpfschollenland zwischen Iramba, Njarasasee, usw. (Map), *n.*, 548; — Hochland der Riesenkrater und die südlich anschließenden Gegenden bis zum Hanang, usw. (Map), *n.*, 547
- Jaeger, J. Tölz und die Isarlandschaft, 315*
- Jaffa. Dr. L. Saad, 155*, plan of, 79*
- Jahn, A. Vias de Comunicación... Venezuela, 950*
- Jahr, A. Geographical Instruction in German Elementary-Schools, 639*
- Jahresbericht der Geograph.-ethnographischen Gesellschaft in Zurich, 1909-10, 316*
- Jamaica: Agricultural Labour Conditions in. A. H. Miles, 475*; Flora of. Containing Description of Flowering Plants from the Island. W. Fawcett and A. B. Rendle, 800*; Geomorphologische Studien im Karstgebiete Jamaikas. Dr. J. V. Danès, 67*
- Jamaica Bay and Rockaway Inlet, L. I., Chart U. S. Coast and Geod. Surv., 631*
- James River Drainage Basin, 475*
- Chart: Hampton Roads to Point of Shoals, 309*
- Jamison, C. E. Mineral Resources of Wyoming, and Mining Laws of the State and the U. S., 880*
- Jan Mayen, Expedition to —, 451; — Expedition of 1911. W. S. C. Russell, 881
- Japan: Art and Art Industries in Japan. Sir Rutherford Alcock, 236*; Awakening of. Okakura-Kakuzo, 400*; Early Days in. Capt. A. C. Hansard, 717*; Guide to Japan, Keeling's, etc., 4th Ed., revised... A. Farsari, 237*; Japan and Her People. A. C. Hartshorne, 237*; — Antarctic Expedition, 291; Japanese improving their Live Stock, 856; Kolonialpolitik. F. Wertheimer, *n.*, 377; Land of the Morning. Account of Japan and its People. W. G. Dixon, 236*; Mining in, *n.*, 701; Outlines of Agriculture in, *rev.*, 700; With Russian, Japanese and Chinese. Experiences of an Englishman during the Russo-Japanese War. E. Brindle, 320*; Sailing Directions and Nautical Remarks: by Officers... command of Commodore M. C. Perry, 237*; Seiches in some Lakes of. S. Nakamura and K. Honda, 717*; Traveller's Notes; or, Notes of a Tour through India, Malaysia, Japan... 1891-93. J. H. Veitch, 240*; True Description of the Mighty Kingdoms of Japan and Siam. Written Originally in Dutch by F. Caron and Joost Schorten, etc. (1671). R. Manley, 237*; Usu-San Eruption and Earthquake and Elevation Phenomena. F. Omori, 951* ¶ Maps of Japan: Geol. Map of Japanese Empire, *n.*, 709; Geol. Map showing Distribution of Stream-Tin in Environs of the Town of Naegi, 877*; Distribution of several types of Copper Deposits, 709*; Map of Esan Volcano, 877*; Usu Volcano, *n.*, 877*; Topographic features of Usu-san and Vicinity, 797*; Top. Map of northern flank of Usu-san showing distribution of 45 Craterlets, etc., 797*; Relation of Volcanic and Seismic Phenomena in West Hokkaido, 797*; Maps of Japanese Lakes. Naval Hydrog. Office, 550*
- Jasper Park, Alberta, Coal Fields of. D. B. Dowling, 948*
- Java: Führer auf-. L. F. M. Schulze, 400*; Ceylon, Malay States and — compared as Plantation and Residential Colonies. J. Ferguson, 638*
- Map of Java: Stand van de Landrente-Metingen op Java en Madoera, 160*
- Jefferson, M. Culture of the Nations, 241; Real New York in 1910, 737
- Jenkins, Hon. J. G. Papua and the Papuans, 558*
- Jensen, H. J. Climates of the Geological Past, 317*
- Jentsch, Dr. Urwald Kameruns, 636*
- Jerid, Date Gardens of the. T. H. Kearney, 556*
- Jesuits: Catalogo de los Manuscritos relativos a los Antiguos Jesuitas de Chile, etc., 640*
- Jimenez, C. P. Estadística Minera en 1908 [Peru], 67*
- Johnson, C. Highways and Byways of the Rocky Mountains, *rev.*, 373
- Johnson, D. W. Hanging Valleys of the Yosemite, 826, 890; History of Grand Canyon District, 285
- Johnson, J. P. Pre-Historic Period in South Africa, *rev.*, 537
- Johnson, N. M., Method of Mapping the Distribution of Marine Alga, 399*

- Johnston-Lavis, Prof. H. J. *Mécanisme de l'activité volcanique*, 73*; *Mechanism of Volcanic Action*, 479*
- Johnston, Pa. and Vicinity, *Mineral Resources of*. W. C. Phalen and L. Martin, 553*
- Johnston, Sir Harry. *Britain Across the Seas*. Africa, *rev.*, 375
- Johnston, W. A. *Simcoe District, Ontario*, 949*
- Jolliet, Louis, *Découvreur du Mississipi et du pays des Illinois, etc.* E. Gagnon, 318*
- Joly, A. *Notes géographiques sur le Sud Tunisien*, 69*
- Jones, E. D. *Causes of Increased Cost of Agricultural Staples, etc.*, 399*
- Jones, H. O. *Some Climbs on the South Side of Mont Blanc*, 793*
- Jonghe, Ed. de, *joint author*, see C. van Overbergh.
- Jorat. *Esquisse géographique*. C. Biermann, 478*
- Jordan, D. S., *et al.* *Fur Seals and Fur-Seal Islands of the North Pacific Ocean*, 239*; *Personal*, 861
- Jordan Valley: *Aufnahmen des Ostjordanlandes durch den Deutschen Palästina-Verein*. Prof. Dr. Guthe, 397*
- Joubin, L. *Études sur les Gisements de Mollusques comestibles des Côtes de France*, 315*
- Jourdan, P. *Cecil Rhodes. His Private Life, rev.*, 536
- Juarez, *Refutacion a Don Francisco Bulnes por* —. G. García, 480*
- Juba River: *Basso Giuba italiano e le concessioni agricole nella Goscia*. Capt. G. Ferrari, 69*
- Judson, K. B. *Myths and Legends of the Pacific Northwest, rev.*, 373
- Julien. *Textes relatifs aux conditions de l'agriculture sous l'ancien gouvernement malgache*, 154*
- Jumano Indians. F. W. Hodge, 221*
- Jura français, *Dérivations glaciaires de cours d'eau dans la Suisse occidentale et le*. Prof. H. Schardt, 71*
- Jurjura Mts.: *Étude phytogéographique de la Kabylie du Djurjura*. G. Lapie, 314*
- Jutland, *Fixation of Dunes on the Coast of*. W. J. Morrill, 718*
- Jutson, J. T. *Contribution to Physical History of Plenty R. and Anderson's Creek, Warrandyte, Victoria*, 226*
- K.
- Kabylia: *Étude phytogéographique de la Kabylie du Djurjura*. G. Lapie, 314*; *Kahului Harbor, Maui Is.*
- Chart U. S. Coast and Geod. Surv., 76*
- Kaiser Wilhelm-Kanal, *Verkehr im — während des Rechnungsjahrs 1910*, 871*
- Kaiser Wilhelms Land. See also German New Guinea: *In das Hinterland der Nordküste des*. Dr. G. Friederici, 156*; *Erforschung des Kaiserin Augusta-Flusses*. A. Penck, 952*
- Kaiserin-Augusta, *Erforschung des — Flusses*. A. Penck, 952* ¶ *Map of: Keizerin Augusta-Rivier, n.*, 392
- Kalahari, *Meine Beide — Reisen 1908-09*. Dr. R. Pösch, 396*; *Deutsche Süd-Kalahari*. Dr. P. Range, 869*
- Kalisch, R. *Trade Routes. Past and Present — East and West*, 399*
- Kamerun. ¶ *Beiträge zur Petrographie der älteren Gesteine . . . Kamerun*. A. Hintze, 555*; *Bericht über die astron. Ortsbestimmungen welche . . . Hauptmann Foerster und Oberleut. Schwartz . . . ausgeführt haben*. Dr. Ambronn, 223*; — *über die astron. — geodät. Ergebnisse der deutsch-französ. Exped. zur Aufnahme des Ostkamerun-Grenzgebietes*. Dr. L. Ambronn, 223*; *Bericht über eine Bereisung des Ostgrenzgebietes der Residentur Adamaua*. K. Strümpell, 555*; *Entwicklung Nordkameruns*. Lieut. Dühring, 555*; *Ergebnisse der Regenmessungen in Kamerun, 1909*, 153*; *Finanzielle Entwicklung —s.* Dr. H. Hesse, 153*; *Der Fischfang der Eingeborenen in den Kolonien Westafrikas*. Dr. A. Gruvel, 791*; *Zur Geologie von —*. B. Struck, 870*; *Geomorphologische Probleme aus —*. Dr. S. Passarge, 153*; *Kameruner Probleme*. Dr. Külz, 152*; *Niederschlagsregister. am Kamerungebirge, 1909-10, unter Berücksichtigung täglichen Regenverteilung in den Tropen*. K. Langbeck, 555*; *Südbahn, 396**; *Unsere Kameruner Eisenbahnen*. E. Walter, 314*; *Urwald Kameruns*. Dr. Jentsch, 636* ¶ *Map of: Stand der geologischen Erforschung des Schutzgebietes —*. O. Mann, 956*
- Kämpfer, O., *joint author*, see E. Harms. 72*
- Kamtchatka, *Travels in — and Siberia, with Narrative of Residence in China*. P. Dobel, 236*
- Kansas: ¶ *Analyses of Crude Petroleum from Oklahoma and Kansas*. D. T. Day, 151*; *Kansas and the Country Beyond . . . from Missouri to the Pacific Ocean, etc.* J. Copley,

- 318*; — and Nebraska Handbook for 1857-8. N. H. Parker, 236*; Results of Spirit Leveling in, etc. R. B. Marshall, 948* ¶ Maps of Kansas: Geological Map of Kansas, 874*; Leavenworth Quad., 75* *Kansas University Science Bulletin*, 152*
- Kansu: Dr. Stein's Maps from Chinese Turkestan and Western —, 450
- Kapteyn, Dr. J. C. Recent Researches in the Structure of the Universe, 640*
- Karakoram: ¶ Expedition of the Duke of the Abruzzi to the Karakoram Himalayas. F. de Filippi, 225*; Kumdan Glaciers in 1902. Dr. S. Hedin, 225*; Saltoro Pass. T. G. Longstaff, 792* ¶ Maps of Karakoram: Explorations in Eastern — by T. G. Longstaff, *n.*, 550; Karakoram Himalayas. Upper Basin of the Baltoro Glacier, Goodwin Austen Glacier and tributaries, *n.*, 160
- Karanög. The Romano-Nubian Cemetery. C. L. Woolley and D. Randall-MacIver, *n.*, 388
- Kara Sea. ¶ Über die Fahrten der Novgoroder durchs karische Meer. und . . . Halbinsel Jalmal zum Ob. A. Sibiriakoff, 70*; Rapport sur l'expédition polaire néerlandaise qui a hiverné dans la mer de Kara en 1882-83. M. Snellen et H. Exama, *rev.*, 146
- Karen Hills, Sketches from. A. Bunker, *n.*, 65
- Karst. Zur Frage des Grundwassers im. Dr. A. Grund, 157*; Die unterirdische Entwässerung im. L. Waagen, 315*
- Karst Phenomena: Geomorphologische Studien im Karstgebiete Jamaikas. J. V. Danes, 67; Karst Country of Southern Asia Minor. E. Huntington, 91; Das Karstphänomen. A. Grund, *rev.*, 215; Unterirdisch entwässerte Gebiete in Innerbosnien. Dr. M. Hoffer, 638*
- Kasai, Commerce dans le bassin du, 68*; Prospects of Rubber Plantations in, 869*
- Kasai-Sankuru, La navigabilité du, 716*, 791*
- Kasasis, Prof. N. Griechen und Bulgaren im neunzehnten und zwanzigsten Jahrhundert, *n.*, 144
- Kashmir, Map: Sketch Map to illustrate explorations of Dr. A. Neve in the Himalayas, 957*
- Kaskaskia R. Drainage Basin. R. Follansbee, A. H. Horton and R. H. Bolster, 948*
- Katanga: ¶ Le commerce au. G. de Leener, 869*; Le Congo au Parlement. Concessions minières au, 314*; Sur les hauteurs du — du lac Moero à Lukafu. Comm. J. Morisseau, *n.*, 695; Heutige Katanga. E. Zimmermann, 68*; Immigration au, 153*; Les Mines de cuivre du. E. Zimmermann, 153*; Le Katanga, 68*; Reserves diamantifères du, 950*; Véritable signification du — pour la Belgique. P. Forthomme, 950* ¶ Maps of Katanga: Carte du District du. H. Droogmans, *n.*, 471; Voies d'accées vers le, *n.*, 78
- Kataphronète, M. Annexion et le Régime intern. de la Corée, 225*
- Katscher, L. Das chinesische Fischerwesen, 156*
- Katz, F. J., *joint author*, see L. M. Prindle.
- Kaufmann, H. Die Auin. Beitrag zur Buschmannforschung, 154*
- Kaunhowen, F. Beobachtungen über Diluvium, Tertiär und Kreide in Ostpreussen, 558*
- Kayser, Dr. E. Lehrbuch der Geologie, *rev.*, 307
- Kearney, T. H. Date Gardens of the Jerid, 556*
- Keeble, F. Plant-Animals, *n.*, 947
- Keele, J. Clay Resources of Western Provinces [Canada], 949*
- Keeler, C., *joint author*, see Wm. H. Dall.
- Keeling's Guide to Japan, —, etc., 4th Ed., revised . . . by A. Farsari, 237*
- Keewatin, Climate and Physical Condition of. A. P. Coleman, 394*
- Keller, Dr. C. Distribution géographique des races antiques parmi les animaux domestiques, 74*
- Keltie, J. S. Recent Progress of Geographical Education in Great Britain, 872*
- Kenai Peninsula: ¶ Glaciers of the Southern Coast of the. U. S. Grant and D. F. Higgins, 721; Prel. Report on Mineral Resources of Southern part of. U. S. Grant and D. F. Higgins, 151* ¶ Map of Kenai Peninsula: Reconnaissance Map of S. W. part, 308*
- Kennan, G. Tent Life in Siberia, *n.*, 209
- Kentucky Maps: Dawson Springs Quad., 629*; Princeton Quad., 75*
- Kermadec Islands, Petrological Notes on Rocks from —, with some Geological Evidence for Existence of Subtropical Pacific Continent. R. Speight, 70*

- Kermorgant, Dr. Alcoolisme dans les colonies et les pays tropicaux, 479*
- Keyes, C. R. Abundance of Meteorites on the Painted Desert, and Its Bearing upon Planetesimal Hypothesis of the Origin of the Earth, 560*; Relations of Present Profiles and Geol. Structures in Desert Ranges, 474*
- Key West Harbor and Approaches, Chart U. S. Coast and Geod. Surv., 545*
- Khont-Hon-Nofer. The Lands of Ethiopia. H. K. W. Kumm, *rev.*, 925
- Kiachta. A. Schönebeck, 224*
- Kientchang et Lolotie. Chinois—Lolos—Sifans, Dr. A. F. Legendre, *n.*, 376, 717*
- Kilauea and Mauna Loa, Volcanoes of. W. T. Brigham, *n.*, 141
- Kimakowicz-Winnicki, M. von. Spinn- und Webwerkzeuge, 72*
- Kimberley, Some Observations of Dew at. J. R. Sutton, 55
- Kindle, E. M. Southerly Extension of Onondaga Sea in the Alleghany Region, 714*
- Kingston, The Story of Old —. A. M. Machar, *n.*, 532
- Kirchhoff, R. Über das Verhältnis der Geschlechter in Indien, 225*, *n.*, 305
- Kirghize, La question — et la colonisation des Steppes. M. J. Castagné, 477*
- Kirschstein, E. Fr. Heissen Quellen von Mtagata in Karagwe, 154*
- Kislovodsk, Climate of — and Comparison with Other Climatological Stations. [In Russian.] A. Voeikov, 793*; Map, *n.*, 549
- Kissingen: Beziehungen zwischen Regenfall u. Quellergiebigkeit unter besonderer Berücksichtigung Münchener Wasserversorgung und der Kissingener Quellen. Dr. L. Frank, 871*
- Kites: Drachenbeobachtungen an Bord "de Ruyter" angestellt vom A. E. Rambaldo während der Fahrt nach Ost-Indien und . . . Aufenthalts in W.-Indien, 1909. Dr. E. van Everdingen, 720*; Photographie en Cerf-Volant. Dr. M. D'Halluin, 872*
- Kjellén, R. Die schwedischen Erdbeben, 398*; Seismische Karte von Schweden, 80*
- Klautsch, A. Der jüngste Vulkanausbruch auf Savaii, 558*
- Kleinkemm-Kettwig, Dr. Erforschung der Namib, 69*
- Klipstein, A. V. Beiträge zur geologischen und topographischen Kenntnis der östlichen Alpen, 238*
- Klotz, O. Earthquake Epicentres, 399*; Microseisms, 399*; Seismograph, 399*
- Klubbütten-Album des Schweizer Alpen-Club, 880*
- Knoch, Dr. K. Die Winde in Deutschland, 793*
- Knopf, A. Geology of Berners Bay Region, Alaska, 635*; Mining in S. E. Alaska, 474*
- Knörzer, A. Anormale Temperaturverteilung im unterfränkischen Main- und Saaletal, 71*
- Kob, Dr. C. West-Masuren, *n.*, 144
- Koch, Capt. K. F. Explorations in W. New Guinea, 857
- Koch, Dr. M. Beiträge zur Kenntnis der Höhengrenzen der Vegetation im Mittelmeergebiete, *n.*, 933
- Koch-Grünberg, Dr. T. Forschungsreise des Dr. H. Rice im Flussgebiet des Rio Caiary-Uaupés, 950*; — Returns to the Amazon Basin, 525
- Koebel, W. H. Uruguay, *rev.*, 695
- Koert, W., und F. Tornau. Zur Geologie und Hydrologie von Daressalam und Tanga, *n.*, 927
- Konakry, Chemin de fer de — au Niger. A. Terrier, 154*
- Koneza, M. Maps illustrating "Les Cirques de Montagne" (Alpes françaises et Tatra), 958*, 959*
- Kongolo-Bukama, Navigabilité du bief, 791*
- Kootenay, Reconnaissance in East —. S. J. Schofield, 949*
- Köppen, W. Luftbahnen am Erdboden und in der freien Atmosphäre, 317*; Wodurch ist die Höhe Wärme Europas und des Nordatlantischen Ozeans bedingt?, 638*
- Korea: ¶ Annexion et le Régime international de la Corée. M. Kataphonète, 225*; Foreign Trade, Agriculture, etc., 951*; Korea. C. J. D. Coulson, *n.*, 377 ¶ Maps of Korea: Dr. B. Kotô's Geol. Sketch Map of Hol-gol District, 79*; Map showing Distribution of Iron Ore in —, 877*
- Kossina, Dr. G., Editor. Kunst- und Völkerentwicklung, *n.*, 216
- Kotô, Dr. B. Geologic Sketch Map of Hol-gol District, 79*
- Kotzebue, A. von. Travels from Berlin, through Switzerland to Paris in 1804, 238*
- Kozlov, Col. P. K. Mongolian-Szechuan Expedition of the Imp. Russian Geog. Soc., 396*; Spedizione nella Mongolia e nel Seciuian, 951*; Personal, 372
- Krämer, Prof. Dr. A. Anthropologie und Ethnographie (Forschungsreise S. M. S. Planet), *n.*, 212; Verlauf der

- Deutschen Marine-Expedition 1907-9, 226*
- Kramm, H. E. *Serpentines of Central Coast Ranges of California*, 151*
- Krause, C. *Notes on German South-West African Diamonds*, 637*
- Krause, G. A. *Beitrag zur Kenntniss des Klimas von Salaga, Togo und Goldküste*, 950*
- Krebs, N. A. *Grunds Studien zur Morphologie und Morphogenese der Hercegovina*, 638*
- Krebs, W. *Das Erdbild in Mondentfernung*, 953*
- Kretschmer, K., *Portolani italiani del Medioevo. Secondo l'opera di —. C. Errera*, 953*
- Kreyenberg, Dr. *Beitrag zur Kenntnis der Fische des Jangtze und seiner Zuflüsse*, 70*
- Krischtafowitsch, N. J. *Sur la dernière période glaciaire en Europe et dans l'Amérique du Nord en rapport avec la question de la cause des périodes glaciaires en général*, 317*
- Kroeber, A. L. *Chumash and Costanoan Languages*, 221*; *Morals of Uncivilized People*, 399*
- Krüger, Dr. G. *Sturmflut an der Küste Pommerns, Dez., 1904 (Map)*, 710*
- Krüger, Prof. P. *Andine Gebiet Patagoniens zwischen 40° und 44° S. (Map)*, n., 634; *Die Patagonischen Anden zwischen dem 42. und 44. Grade s. Breite*, 949*
- Krumm, Dr. K. *Map showing —'s Route in Central Africa*, 472*
- Kubus of Sumatra, *Absence of Religious Conceptions among the*. Prof. W. Volz, 686
- Kühn, F. *Beiträge zur Kenntnis der Argentinischen Cordillere*, 555*, 847; *Croquis-Itiner. de de Rosario de Lerma hasta Cachi (Map)*, 471*
- Kühn in the Andes, 524
- Kuhnert, M. *Schulwandkarte vom Königreich Bayern*, n., 235; — and Dr. G. Leipoldt. *Asia (Physical Wall Map)*, n., 235
- Külz, Dr. *Kameruner Probleme*, 153*
- Kumdan Glaciers in 1902. Dr. S. Hedin, 225*
- Kumm, H. K. W. *From Hausaland to Egypt, through the Sudan*, *rev.*, 535*
- Khont-Hon-Nofer. *The Lands of Ethiopia*, *rev.*, 925
- Kümmel, H. B. *Notes on Mineral Industry (N. J.)*, 714*
- Kurdistan: ¶ *Kurdistan—ein länderkundlicher Begriff?* E. Banse, 951*; *Reisebilder aus Mesopotamien und Kurdistan*. Dr. H. Frh. v. Handel-Mazzetti, 557* ¶ *Map of Kurdistan: Tektonische Bedingtheit der Kurden-sitze*, 709*
- Küstendil, *Durch das Strumadefilee nach der bulgarischen Thermostadt —. F. Meiphard*, 315*
- Kyoto: *Guide to the Celebrated Places in Kiyoto & the Surrounding Places for the Foreign Visitors*. K. Yamamoto, 560*
- L.
- Labbé, P. *Le progrès du Transsibérien*, 224*; *A travers la Serbie*, 793*
- Laboulaye, E. de. *Chemins de fer chinois*, 637*
- Labrador, *Across — from Nain to George or Barren Grounds River*. H. H. Prichard, 152*; *Beyond the Height-of-Land*. R. McFarland, 635*; *Les Esquimaux du Nord- S. Waldmann*, 554*; *Five Months in — and Newfoundland during the summer of 1838*. E. W. Tucker, 480*; *Labrador*. Dr. W. T. Grenfell, 789*; *Land of Eternal Warring*. W. T. Grenfell, 222*
- La Bruyère, R. *Trois archipels de la Polynésie orientale. Samoa, Îles sous le Vent, Marquises*, 638*
- Ladak and Lahoul, *Sixty Days Marching through*. Mrs. A. Schuster, 717*
- Lagally, Dr. M. *Alpeiner Ferner in Stubai 1909*, 477*; *Gletscherbeobachtungen in Selrain und nördlichen Stubai 1909*, 477*
- Lager, E. *The steppes of l'Ancien Monde*, 792*
- La Guaira: *Ferrocarril de — a Caracas*. J. Flind, 636*; *La Guaira the picturesque*. I. A. Manning, 153*; *Plano para el Estudio de la Desviación de la Plomada en*, 876*
- Lahitte, E. *Milling Industry in Argentina*, 314*
- Laing's (Major Gordon) *Grave Discovered*, 525
- La Jonquière, (Lajonquière), *Comm. E. de. A propos de deuxième session du Conseil fédéral des États malais*, 638*; *A travers le Siam*, 477*
- Lakes: ¶ *Bathymetrical Survey of Scottish Fresh-Water Lochs*, *rev.*, 933; *Ergebnisse neuerer simultaner Temperaturmessungen in einigen tiefen Seen Europas*. Dr. W. Halb'ass, 317*; *Instrumental Survey of Shorelines of Extinct Lakes Algonquin and Nipissing in S. W. Ontario*. J. W. Goldthwait, 949*; *Zur Kenntnis der Seen der Hohen Tatra*. Prof. Dr. Halb-

- fass, 477*; Lakes of Guatemala. E. F. Tisdell, 395*; Lakes of the Salt Range in Punjab. T. H. D. La Touche, 225; Seiches in some lakes of Japan. S. Nakamura and K. Honda, 717*; Zur Verbreitung und Entstehung der Posener Seen. H. Schütze, 639*; Wirtschaftliche Bedeutung der Binnenseen. Prof. Dr. W. Halbfass, 399* ¶ Maps of Lakes: Lacs Égéen et Pannonien, etc., Carte du Lac Égéen. J. Cvijić, 710; Position of Lake Shang-ie, 709*; Schetskaart van het Sentani-Meer, Noord Nieuw-Guinea. F. J. P. Sachse, n., 957
- Lala, R. R. Philippine Islands, 400*
- Laliberté, F. Une Expédition dans l'Abitibi, 715*
- Lallemand, Ch. Nivellement général de la France, progrès de 1899 à 1908, 71*; Maps for Airships, 922; Résultats scientifiques de la mission Tilho, 223*
- Land-Bridge, On Evidences of a Former — Between Northern Europe and America. R. F. Scharff, 228*
- Landensio, E. Excursion a la Caverna de Cacahuamilpa y Ascension al Crater del Popocatepetl, 236*
- Lander, Richard, and Mungo Park, Memorial to, 918
- Landes, H. Road Materials of Washington, 880*
- Land Forms. See also Geomorphology: Notes on the Description of Land Forms. Prof. W. M. Davis, 46, 190, 598, 679, 847; Place of Deduction in Description of Land Forms. W. M. Davis, 598; Repeating Patterns in the Relief and in the Structure of the Land. W. H. Hobbs, 719*; Land Reliefs that are True to Nature. G. C. Curtis, 418
- Landor, A. H. Savage. Sources principales du Brahmapoutre et du Sutledje, 225*
- Landscapes: Interprétation géographique des paysages. P. Vidal de la Blache, 873*
- Landslides: Der Bergsturz von Elm den 11. September 1881. E. Buss and A. Heim, 238*
- Langbeck, K. Lightning Strokes and Telephones, 920; Niederschlagsregistr. am Kamerungebirge . . . 1909-10, unter Berücksichtigung täglichen Regenverteilung in den Tropen, 555*
- Lange, A. Rubber Workers of the Amazon, 33
- Langheld, Maj. W. Wirtschaftlichen Fortschritte in unseren afrikanischen Kolonien, 791*
- Languages: ¶ Expansion de la langue française dans le monde. J. de Novicov, 479*; Finnish Self-Taught. A. Renfors, n., 149; Gemeinindonesisch und Urindonesisch. R. Brandstetter, 720*; Handbook of American Indian Languages, 367; Hungarian Self-Taught. Count de Soissons, n., 149; Ilokono Dialect: *Iti Dalan Ti Santa Nga Krux* (The Way of the Holy Cross). Edited and compiled by F. C. Meredith, 880*; Indian Languages of Mexico and Central America and Their Geographical Distribution. C. Thomas and J. R. Swanton, 868*; Linguistische Probleme in ethno., anthrop., und geogr. Beleuchtung. Dr. A. Dirr, 318*; Travellers' Practical Manual of Conversation in English, French, German and Italian, n., 149; Living Speech in Central and South Africa. Essay Introductory to Bantu Family of Languages. A. C. Madan, rev., 925 ¶ Maps: Germany: Die Muttersprache, etc., 878; Linguistic Map of Mexico and Central America (Bur. of Ethnology). C. Thomas and J. R. Swanton, 706*; Sprachenkarte des Gebietes zwischen Kongo und Ubangi. F. R. Thonner, n., 159; Verbreitungsgebiet der deutschen Sprache in Ungarn, 878
- Langman, C. Bohn's Hand-book of Washington, 400*
- Laos, Un Voyage au. E. Lefèvre, 237*
- Lapie, G. Étude phytogéographique de la Kabylie du Djurjura, 314*
- Laplace [Cyrille Pierre Théodore]. Voyage autour du Monde. Exécuté pendant 1830-32 sur la Corvette La Favorite, Atlas Hydrogr., 239*
- Lapland: ¶ Lappland. Erinnerungen an den Intern. Geologenkongress 1910. W. v. Seidlitz, 793*; Visit to —. A. L. Cross, 398* ¶ Maps of Lapland: Carte de la Laponie suédoise indiquant la distribution des gisements de pin sylvestre et de bouleau subfossiles. A. Gavelin, 551*; Carte des limites de la végétation forestière dans la vallée du Kamajokk, 552*
- La Plata, Museum of. Rev. C. W. Currier, 636*
- Largeau, Col. Les Dinkas, 790*
- La Rue, E. C., and F. F. Henshaw. Surface Water Supply of the Great Basin, 1909, 635*
- Latimer, E. W. Russia and Turkey in the Nineteenth Century, 320*
- La Touche, T. H. D. Gen. Report on Geol. Survey of India for 1909, 225*; Lakes of the Salt Range in the Punjab,

- 225*; Mineral Production of India during 1909, 225*; Notes on Certain Glaciers in Sikkim, 225*
- Latzina, F. Argentina studied from Physical Point of View, 395*; Trade, Past and Present, 314*
- Laub, Lieut. W. Kaptajn Einar Mikelsens Ekspedition, 228*
- Launay, A. Histoire de la Mission du Thibet, *rev.*, 538
- Launay, L. de. La Conquête minière, *rev.*, 217
- Laurent, G. Armagnac et les pays du Gers, 718*
- Lavalle y Garcia, J. A. Cotton Production of Peru, 715*
- Lavenir, P. Agrolology of the Argentine Republic, 395*
- Lea, H. C. Inquisition in the Spanish Dependencies, *n.*, 947
- Leach, W. W. Skeena R. District, 949*
- Leachman, Capt. G. E. Map of N. E. Arabia showing routes of —, 1910, and other explorers, 392*
- Lebeau, H. Otahiti. Au Pays de l'éternel Été, *rev.*, 379
- Le Blond, Mrs. Aubrey (Mrs. Main). Adventures on the Roof of the World, 320*; My home in the Alps, 238*
- Leclercq, J. Colonisation chez les Hollandais, 398*; Trip to Ararat [In Russian], 70*
- Lecocq, A. Le Maroc occidental, 869*
- Lecoinge, G. Organisation générale de l'Institut Polaire International, 872*
- Leener, G. de. Le commerce au Kantanga, 869*
- Leeward Islands, Agricultural Conditions in. H. A. Tempamy, 554*
- Lefèvre, Lieut. E. Voyage au Laos, 237*; — and Nehlil. Région de Taf-rata et les tribus qui l'habitent, 69*
- Leffingwell, E. de K., in Alaska, 199; writes from Flaxman Island, 528
- Lega, M. In Dancalia ed in Abissinia, 636*
- Legendre, Dr. A. F. Explorations dans la Chine occidentale, 717*; Kientchang et Lolotie. Chinois—Lolos—Sifans, *n.*, 376
- Legendre, R. La pêche à marée basse, 317*
- Legge, C. Rapport de l'exploration à la Baie Georgienne, 560*
- Lehfeldt, R. A. Gravity in South Africa, 791*
- Leighton, H., *joint author*, see D. H. Newland.
- Leiningen, Dr. W. Graf zu. Über Erdpyramiden, 74*
- Leipoldt, Dr. G. Kuhnert physikalische Erdkarte in Mercators Projektion mit Darstellung der Meeresströmungen, *n.*, 235; Verkehrskarte von Mitteleuropa, *n.*, 235; see also M. Kuhnert, *joint author*.
- Lemoine, P. Les mines de plomb et de zinc en Algérie, 716*; Ressources de la France en minerais de fer, 477*
- Leon, Captain Alonso de, *et al.* Historia de Nueva Leon, con Noticias sobre Coahuila, Tejas, y Nuevo Mexico . . . Documentos inéditos . . pub. por G. Garcia, 480*
- Leonard, A. G. Natural Gas in North Dakota, 474*
- Leonard, J. W. History of the City of New York, 236*
- Leopold II, Lac. La numération chez les Peuplades du —. M. J. Maes, 223*
- Leroy, O. E. Slovan District, B. C., 949*
- Levainville, J. Les ouvriers du coton dans la région de Rouen, 558*
- Levant, Relation d'un Voyage du —, fait par ordre du Roi. [Joseph] Pitton de Tournefort, 320* ¶ Map: Levant, Goode's Base Map, *n.*, 712
- Levasseur, E. Les Alpes et les grandes Ascensions, 238*
- Le Vasseur, N. Le chemin de fer de Matane et Gaspé, 715*
- Levasseur, Pierre Émile, *Obituary*, 862
- Leverett, F. Comparison of North American and European Glacial Deposits, 201; 317*; History of Great Lakes, 52; Outline of the History of Great Lakes, 553*
- Lexikon, Meyers Grosses Konversations —. Sechste Aufgabe, 320*
- Libbey, Prof. W. The Nile, 637*
- Liberia: ¶ Boundary between Liberia and Ivory Coast, 855; Conditions in, 69*; Forschungsreise von Dr. W. Volz in das Hinterland von Liberia. Dr. R. Zeller, 154*; Notes on the only American Colony in the World. E. A. Forbes, 69*; Notizie sulla Repubblica di — Specialmente secondo i Viaggi e gli Studi di J. Büttikofer. Prof. G. Cora, 637*; Reise durch das Hinterland von Liberia in Winter 1906-7. Dr. W. Volz, 476*; Verhältnisse Liberias nach amerikanischer Auffassung, 154*
- Library Index, Annual, 1910. Edited by W. I. Fletcher, 560*
- Libyan Desert: Exploring — Waste in an Airship, 288; Siwah. Oase des Sonnengottes in der libyschen Wüste. J. C. E. Falls, *rev.*, 628
- Light, Col. W. Brief Journal of Proceedings of —, with Few Remarks on some Objections made to them, 718*;

- Biographical Sketch of — the First Surveyor-General of Australia. T. Gill, 718*
- Lightning Strokes and Telephones. K. Langbeck, 920
- Lignite: A New Source of Power. G. E. Mitchell, 72*
- Limousin, Limite de la montagne dans le (Map), 878*
- Lincoln, F. C. Certain Natural Associations of Gold, 953*
- Lindgren, W. Production of Metals and Ores in 1908 and 1909, 522
- Lindsay, F. Cattle Raising in Chiriqui, 636*; Up Country in Panama, 314*
- Lindsay, J. Voyage to the Coast of Africa in 1758, 400*
- Ling, C. F. Dawn in Toda Land, *n.*, 305
- Lingley, C. R. Transition in Virginia from Colony to Commonwealth, *n.*, 295
- Linschoten, Jan Huygen van. Itinerary Voyage ofte Schipvaert van — naar oost ofte Portugaels Indien 1579-1592. Edited by Dr. H. Kern, 951*
- Lionnet, J. Chez les Français du Canada, *rev.*, 61
- Little, A. Across Yunnan, *rev.*, 210
- Livi, R. Distribuzione geografica della robustezza in Italia, 793*
- Livingston, L. S. American Book-prices Current. Record of Books, etc., sold at Auction . . . 1909-10, 320*
- Lloyd, Capt. R. E. Geology of Aden Hinterland, 70*
- Lobster: Untersuchungen über den Hummer. Dr. A. Appellöf, 317*
- Loire, Haute: See Haute-Loire.
- London, Map: Bartholomew's "Quarter Inch to Mile" Contour Road Map of the Environs of, *n.*, 958
- Longe, Col. F. B. General Report on Operations of the Survey of India, 1908-09, 396*
- Long Island Sound, North Shore of, 631*; Fairfield to George's Rock, 76*, 309*; Rhineck to New Rochelle (Charts U. S. Coast and Geod. Surv.), 76*
- Longrée, F. Les îles Canaries, 791*
- Lengstaff, T. G. Across the Purcell Range of British Columbia, 868*; Explorations in Eastern Karakoram (Map), *n.*, 550; Saltoro Pass, 792*; Survey of Himalaya, 396*, 638*
- López Perea, E. Territorios Españoles del Muni, 224*
- Lop-Nor Problem und seine Lösung. H. Schmitthenner, 156*; Le désert de Lop à la lumière des récentes explorations. S. Hedin, 791*
- Lorena, A. Algunos materiales para la antropología del Cuzco, 715*
- Lorentz, H. A. Expedition to the Snow Mountains of New Guinea, 718*, 952*; Map, 472*, 710*; his Explorations in Dutch New Guinea, 837
- Loreto, Peru: Mapa del Departamento de — corregido y aumentado con los estudios de los Srs. Espinar, Buenaño y otros, *n.*, 547
- Lorié, Dr. J. Het Scheldediluvium, 639*
- Lorin, H. Amérique latine d'aujourd'hui, 222*
- Lorraine française et Lorraine allemande. A. Rampal, 478*
- Lorrie, W. S. Peru's Cotton Industry, 153*
- Los Angeles Aqueduct. Carrying Water Through a Desert. B. A. Heinly, 221*
- Lötschberg Tunnel, 528, 689; Einbruch des — unter dem Gasterntal. Dr. J. Früh, 71*
- Louisiana: ¶ Oil and Gas in —, with Brief Summary of their Occurrence in Adjacent States. G. D. Harris, 66*
- ¶ Maps of Louisiana: Map of Forest Regions, 707*; Mound Quad, 75*; Production of cotton in 1909, 229*; Charts U. S. Coast and Geod. Survey: Point au Fer to Marsh Island, 631*; San Luis pass to Matagorda Bay, 631*
- Lowell, P. Evolution of Worlds, *n.*, 388
- Lualaba, Du — au Moero. E. Slosse, 950*
- Lübeck, Eine landeskundlicher Grundriss. Dr. H. Spethmann, 315*
- Lucerna, R. Anciens glaciers de la Corse et les oscillations pleistocènes de la Méditerranée, 560*; Eiszeit auf Korsika und das Verhalten der Exogenen Naturkräfte seit dem Ende der Diluvialzeit, 315*
- Lucien, Lieut. Ouadai Aouali, 556*
- Lüderitzland, Das. Dr. P. Range, 716*
- Ludewig, H. J. Kautschukkultur in Mexico, 67*
- Lukach, H. C. Bibliography of Sierra Leone, *n.*, 781
- Lumsden, Col. D. M., and N. Williamson. A journey into the Abor Country, 709*
- Lüneburg Heath: Höhenschichtenkarte der Lüneburger Heide. Dr. K. Olbricht, 226*
- Lunet de Lajonquière, Com. E. De Saigon à Singapour par Angkor autour du Golfe de Siam, 225*

- Lupton, C. T. Eastern Part of the Bull Mountain Coal Field, Mont., 867*; — and H. Hinds. Map of N. E. part of Bull Mountain Coal Field; Map of S. E. Part of —, Montana, 630*; see also R. W. Stone, *joint author*.
- Lütgens, Dr. R. Beiträge zur Kenntnis des Quebrachogebietes in Argentinien und Paraguay, 715*
- Luzon, Charts U. S. Coast and Geod. Survey: Albay Gulf and Part of Lagonoy Gulf, East Coast of, 545; Inland Waters South of Luzon, Ragay Gulf to Tayabas Bay, 309*; Passages between — and Masbate, 158*; Southwestern — and Mindoro, 158*; West Coast of Luzon. Manila Bay to Candon Point, 309*
- Lyon, G. E. New Jersey and Forestry, 221*
- Lyons, Capt. H. G. Survey of Egypt, 67*; Valley of the Nile, 717*
- Lyons, W. J. On Distribution of Mean Annual Rainfall . . . Over Area Including Counties of Dublin, Wicklow, etc. 398*
- M.
- Maas, Dr. O. Contributions au Système des Méduses, basées sur des Formes bathypélagiques des campagnes scientifiques de Prince de Monaco, 317*
- McAlister, D. A., *joint author*, see C. G. Moor.
- McAter, W. L. Our Grosbeaks and their Value to Agriculture, 948*
- McCallie, S. W. Drainage Situation in Georgia, 880*
- McClintock, W. Old North Trail. or Life, Legends and Religion of Black-foot Indians, *n.*, 533
- McConnell, R. G. Portland Canal District, B. C., 949*
- McCormick, F. Vandalism in China, 56
- McCracken, L. Gubbio, Past and Present, 320*
- MacCurdy, G. G. Recent Discoveries Bearing on the Antiquity of Man in Europe, 477*
- McCutcheon, J. T. In Africa. Hunting Adventures in the Big Game Country, *n.*, 375
- Macdonell, A. In the Abruzzi, *n.*, 702
- Macdougall, Dr. D. T. Organic Response, 399*
- McDougall (John). Forest, Lake and Prairie. Twenty Years of Frontier Life in W. Canada, 400*
- Macedonia: Die Oberfläche Mazedoniens. K. Oestreich, 227*
- Macfarlane, J. J. Commercial Venezuela. Analysis of its Export and Import Trade, 869*; Growth and Extent of Textile Industries of Philadelphia, 789*
- McFarland, R. Beyond the Height-of-Land (Labrador), 635*
- Machaček, Dr. F. Fortschritte der geographischen Forschungen in Asien im Jahre 1910, 717*; Die mineralischen Schätze der Vereinigten Staaten, 221*; Tal und Glazialstudien im unteren Eisackgebiete, 315*; Machaček's Explorations in Turkestan, 856
- Machar, A. M. The Story of Old Kingston, *n.*, 532
- McInnes, W. Report on Part of N. W. Territories drained by Winisk and Attawapiskat Rivers, 554*; Saskatchewan R. District, 949*
- Mackinder, H. J. Nations of the Modern World. Elementary Study in Geography, *n.*, 543
- McKinley Mount Region, Maps: Geol. Reconnaissance Map of. A. H. Brooks and L. M. Prindle, 795*; Reconnaissance Map of — region, 795*; Sketch Map showing distribution of timber, *in*, 795*
- MacLeod Falls on the Mao Kabi, French Equatorial Africa. P. A. Talbot, 637*
- MacLeod, O., and P. A. Talbot. Explorations in Lake Chad Region, 526
- Macmillan, H. Holidays on High Lands: or Rambles . . . search Alpine Plants, 238*
- McMillan, R. Cables and the Empire, 316*
- Macquarie Island and its Robinson Crusoe. Capt. J. K. Davis, 126
- MacQueen, P. Sleeping Sickness in Uganda, 181
- McQuill, T. Connecticut by Daylight, 400*
- MacRitchie, D. Kajak im nördlichen Europa, 952*
- Madagascar: Densité de la population à Madagascar. E. de Martonne, 791*; Élevage de l'autruche. Schuler, 155*; Enquête sur la valeur commerciale des produits de. Fauchère, 154*; Enseignement aux indigènes, *n.*, 149; Exploitation commerciale. Statistique des transports, 155*; Madagascar Railroad, 620; Remarques sur la géographie botanique de. Dr. B. P. G. Hochreutiner, 69*; Service maritime postal de la Côte et de Madagascar, 155*; Statistiques du Commerce . . . 1908: Madagascar et Dépendances, 556*; Statistiques de l'Industrie Minière . . . 1908, 791*; Textes relatifs aux conditions de l'agriculture sous

- l'ancien gouvernement malgache. Julien, 154* **¶** Map of Madagascar: Carte du Pays Mahafaly. Lieut. Bühner, 391*
- Madan, A. C. Living Speech in Central and South Africa, *rev.*, 925
- Madeira-Mamoré Railway. P. H. Ashmead, 636*
- Madison, Wis.: A Model City. J. Nolen, *rev.*, 625; **¶** Maps: General Plan for District of the Four Lakes, 707*; Park System of the City, 707*; Suggestive Plan for Madison, a Model City, 707*
- Madoera, Java en — Stand van de Landrente-Metingen op — (Map), 160*
- Maes, M. J. La numération chez les Peuplades du Lac Leopold II, 223*
- Magdalen Islands, Chart of, 796*
- Magellan, Ferdinand. The Discoverer of the Philippines. J. D. Champlin, 587
- Magellan, Strait of, Early Spanish Voyages to —. Introduction and Notes by Sir Clements Markham, 800*
- Magnetism: **¶** Broader Aspects of Research in Terrestrial Magnetism. Dr. L. A. Bauer, 317*; Circumnavigation Cruise of "Carnegie," for 1910-13 and Perfection of her Magnetic Work, etc. L. A. Bauer, 317*; Magnetic Surveys, Yacht Carnegie, 292; Report for 1910 of the Department of — Carnegie Institution. Dr. L. A. Bauer, 479*; Summary of Work of the Department in 1910-11. Dr. L. A. Bauer, 560*; Magnetic Character of Year 1909. G. van Dyk, 317*; Magnétisme terrestre, 479*; Physical Theory of the Earth's Magnetic and Electric Phenomena. No. IV. On Origin of Earth's Magnetism. L. A. Bauer, 720*; Projet du Levé magnétique de l'Empire Russe et les Travaux magnétiques. M. Rykatchev, 793*; Report of Magnetic Survey of South Africa, *n.*, 926; Results of Magnetic Observations made by the Coast and Geod. Survey, 1909-10. R. L. Faris, 635*; Results of Observations made at the Coast and Geod. Magnetic Observatory at Cheltenham, Md., 1907-8. D. L. Hazard, 635*; near Honolulu. 1907-8. D. L. Hazard, 870*; at Sitka. 1907-8. D. L. Hazard, 867*; Die saecularen Aenderungen der Erdmagnetischen Elemente. Dr. H. Fritzsche, 317*
- Mahan, A[lfred] T. Influence of Sea Power upon History. 1660-1783, 239*
- Maiden, J. H. Sir Joseph Banks: The "Father of Australia," *rev.*, 141
- Main, Mrs. [Mrs. Aubrey Le Blond]. My Home in the Alps, 238*; Adventures on the Roof of the World, 320*
- Maine: **¶** First Annual Report, State Water Storage Commission, 880*; Geology of Pegmatites and Associated Rocks of — including Feldspar, Quartz, etc. E. S. Bastin, 714*; Occurrence and Composition of Well Waters in the Slates of. F. G. Clapp, 553*; Results of Spirit Levelling in Maine, etc. 1896-1909. R. B. Marshall, 66*; Some Ore Deposits in — and the Milan Mine, N. H. W. H. Emmons, 313*; State Survey Commission of, 521 **¶** Maps of Maine: Distribution of Granite and Related Rocks and Locations of Quarries in Pegmatite Deposits, 389*; Ellsworth Quad., 873*; Fryeburg Quad., 873*; Kames of Maine and S. E. New Hampshire, 954*; Charts U. S. Coast and Geodetic Surv.: Mt. Desert Island, 76*; Penobscot Bay, East —, 875*; St. George River and Muscle Ridge Channel, 309*
- Main- und Saalethal, Anormale Temperaturverteilung im unterfränkischen. A. Knörzer, 71*
- Malaga Santolalla, F. Departamento de Cajamarca, 790* — and C. Vallejos Z. Map of Cajamarca, 547*
- Malay Archipelago. See also Sunda Islands: **¶** Eigenaardige Gebruiken Bij Pokken-Epidemiën in den Indischen Archipel. F. D. E. van Ossensbruggen, 557*; Elementare Theorie der Gezeiten; nebst den Gezeitenkonstanten der wichtigsten Orte des Indischen Archipels und anderer Hafenplätze. J. P. van der Stok, 953* **¶** Map of Malay Archipelago: Linien gleicher Gezeitenphase im Ostindischen Archipel. Dr. J. P. van der Stok, 798*
- Malay Peninsula: **¶** De Saigon à Singapour, par Angkor, autour du Golfe de Siam. Com. E. Lunet de Lajonquière, 225*; Traveller's Notes, or, Notes of a Tour through India, Malaysia, etc., 1891-93. J. H. Veitch, 240*
- Malay States, The Federated Protected: **¶** Chemin de fer de Bangkok à la Malaisie Britannique, 156*; Ceylon, — and Java compared as Plantation and Residential Colonies. J. Ferguson, 638*; Illustrated Guide to the Federated Malay States, *rev.*, 697; A Propos de la deuxième session du Conseil fédéral des États malais. [Summary of Development]. Comm. E. de Lajonquière, 638*
- Malayo-Polynesians: Grundlinien einer Vergleichung der Religionen und

- Mythologien der austronesischen Völker. P. W. Schmidt, 72*
- Maler, T. Explorations in the Department of Peten, Guatemala, 949*
- Mallet, E. Exploration de la rivière N'Goindé, 476*
- Mallet, G. Lettres sur la Route de Genève à Milan par le Simplon écrite en 1809, 10me éd., 238*
- Malta, Tre giorni a —. Ant. M. Annoni, 398*
- Mammals, The Age of — in Europe, Asia and North America. H. F. Osborn, *rev.*, 541
- Mamontov, V. N. *Altaiiskii Meteorit 1904 goda* [Altai Meteorite], 74*
- Manchuria: ¶ Ferrovie della Manciuira e l'Accordo Russo-Giapponese. E. Catellani, 224* ¶ Maps of Manchuria: Distribution of Iron Ore in, 877*; Postkarte der Mandschurei. Dr. R. Pösch, 472*; Sketch Map of China and —, 877*
- Mandar, Breukenkust van. E. C. Abendanon, 637*
- Mangin, Mission du Colonel — 1910, 223*
- Manila: ¶ Monthly Bulletin, Weather Bureau, for 1909, 225*; Study of Manila Copal. P. C. Freer, 225* ¶ Charts U. S. Coast and Geod. Surv.: Manila Bay, 158*, 309*
- Manipur, The Naga Tribes of. T. C. Hodson, *rev.*, 698
- Manitoba, Maps: ¶ Index Map to Townships, etc., *n.*, 390; Index to Townships in —, etc., 230*; Cereal Maps of —, etc., *n.*, 159
- Manley, R. True Description of the Mighty Kingdoms of Japan and Siam. Written Originally in Dutch by F. Caron and Joost Schorten, etc., 237*
- Mann, O. Stand der geologischen Erforschung des Schutzgebietes Kamerun (Map), 956*
- Mannheim, Hafen von. Dr. W. Götzinger, 871*
- Manniche, A. L. V. Terrestrial Mammals and Birds of Northeast Greenland, 59
- Manning, Dr. R. La Guaira the picturesque, 153*
- Manning, S. Swiss Pictures. Drawn with Pen and Pencil, 238*
- Mansfield, Prof. G. R. Origin of Cliff Lake, Mont., 553*
- Mantero, F. Manual Labour in S. Thomé and Principe, *rev.*, 535
- Maps. See also Atlases, Charts and Cartography: ¶ Colouring of Relief Maps, 639*, 779; Goode's Base Maps, *n.*, 712; Höhenschichtenkarten. Studien und Kritiken zur Lösung des Flugkartenproblems. Dr. K. Peucker, *rev.*, 465 ¶ International Map of the World, 317*, Argentina, Brazil and Chile . . . Share in Preparation of, 59 ¶ Isogonenkarte in besonderer Projektion. Dr. H. Maurer, 799*; Neue Studien über Isochronenkarten. J. Riedel, 953*; Kuhnert physikalische Erdkarte in Mercators Projektion mit Darstellung der Meeresströmungen Bearb. von Dr. G. Leipoldt, *n.*, 235*; Maps and Map-Making. E. A. Reeves, *rev.*, 213; Maps of Primitive Peoples. B. F. Adler. [In Russian.] Résumé in English, 669 ¶ Map Study in Schools. W. M. Gregory, 452, School Wall Maps, *n.*, 80, How to Use Contour Handmaps for Class Teaching. J. A. White, *n.*, 946 ¶ Maps for Aeronauts, 203, Maps for Airships. C. Lallemand, 922 ¶ Tables for Projection of Graticules for Maps on the scale of 1:1,000,000, *n.*, 220 ¶ Historical Maps: Fac-similé de la Figure III de la Carte générale du cours du Gange et du Gange . . . en 1784; — Figure VI de la Carte générale, 879*; Historische Karte von Zeeland nach Utrecht Dresselhuis, 711*; Persistence of Idea of North America as Group of Islands (1502-1622), 799*; Map of Twenty-two Spanish and American Trails and Routes Affecting California, 1694-1849, 799*; Pianta d'Imola. Leonardo da Vinci (Facsimile of a MS.), 799*; Routes of Galleons in the Pacific as Noted in their Log Books, 799*
- Maps, New:
- America, 75, 157, 228, 308, 389, 470, 544, 629, 706, 794, 873, 953
 - Africa, 78, 159, 231, 310, 391, 471, 547, 707, 797, 876, 955
 - Asia, 79, 160, 231, 310, 392, 472, 548, 708, 797, 877, 956
 - Australasia and Oceania, 232, 310, 473, 710, 798, 878, 957
 - Europe, 79, 233, 311, 392, 473, 551, 710, 798, 878, 957
 - Polar Regions, 80, 234, 312, 393, 712
 - World, 80, 473, 552, 879, 959
 - Cartographical, 799, 960
 - Educational, 712, 799, 879
 - Historical, 799, 879
 - Oceanographical, 234, 798, 879
 - School Wall Maps and Atlases, 80, 235, 713
 - General, 473, 713
- Marbut, Prof. C. F. Soils of Ozark Regions, 366
- Marchgebiet. Niederschlag, Abfluss und

- Verdunstung im. Dr. E. Stummer, 397*
- Marckwald, Dr. E., and Dr. F. Frank. Kautschuk-Plantagenbau in seiner Bedeutung und seiner Gefahren für die deutsche Kolonialwirtschaft, 639*
- Marconi, Comm. G. Transatlantic Wireless Telegraphy, 640*
- Marchand, H. États-Unis et les Philippines, 948*; Les musulmans de l'Inde et le nationalisme hindou, 638*
- Mare Is. Strait, Cal., Chart U. S. Coast and Geod. Sur., 631*
- Marek, Dr. R. Waldgrenzkarte der österreichischen Alpen, n., 710
- Margerie, E. de. Étude du profil en long des cours d'eau français, 71*
- Marinelli, Prof. O. Variations périodiques des glaciers. Alpes italiennes, 478*
- Markham, Sir Clements R. Land of the Incas, 153*; Preface and Introduction to Early Spanish Voyages to the Strait of Magellan, 800*
- Marks, E. O. Coal Measures of South East Moreton, 557*
- Marquardsen, H. Oberflächengestaltung und Hydrographie des saharisch-sudanischen abflusslosen Gebietes, 556*
- Marquesas Islands: ¶ Eastern Pacific Lands: Tahiti and —. F. W. Christian, *rev.*, 380; Trois Archipels de la Polynésie orientale. Samoa; Îles sous le Vent; Marquises. R. La Bruyère, 638*
- Marshall, P. Glaciation of New Zealand, 70*
- Marshall, R. B. Results of Spirit Levelling in Alabama, Georgia, and Other States, 1896-1909, 66, 313, 635, 789, 876, 948*; — and A. H. Sylvester. Administrative Map Yosemite National Park, n., 77
- Martin, C. Congo Belge, 223*; La navigation sur le Congo et le Stanley Pool, 716*
- Martin, E. S. Further Experiments on Dew-Ponds, 317*
- Martin, G. C., C. W. Washburne and Others. Investigations of Coal Fields in Colorado and New Mexico, 151*
- Martin, L. Alaskan Earthquakes of 1899, 151*; Geographical Influences in Alaska, 313*; National Geogr. Soc. Researches in Alaska, 948*; Progressive Development of Resources in the Lake Superior Region, 561, 659; see also W. C. Phalen, *joint author*.
- Martinique: Statistiques du Commerce . . . pour 1908, 789*
- Martiny, Dr. R. Kulturgeographische Wanderungen im Koblenzer Verkehrsgebiet, n., 785
- Martonne, Ed. de. La densité de la population à Madagascar, 791*; Érosion glaciaire et la formation des vallées alpines, 558*; Évolution du Relief de l'Asie centrale, 557*; Sur la position systématique de la chaîne des Karpates, 71*
- Martrou, L. Le Nomadisme des "Fangs," 314*
- Maryland: ¶ Maryland under Commonwealth. Chronicle of the Year 1649-1658. B. C. Steiner, 867*; — Weather Service, *rev.*, 693; Results of Spirit Levelling, 1896-1909. R. B. Marshall, 66* ¶ Maps of Maryland: Anne Arundel Co., Soil Survey, 77*; Antietam Quad., 75*; Emmetsburg and Prince Frederick Quadrangles, 629*; Distribution of Granite Quarries and Granites, 76*; Floristic Zones and Ecological Districts, 77*; Map showing limestone of, 77*; Map showing relative valuation of farm buildings; relative production of corn, wheat, tobacco, hay and milk; acreage in canning crops, 77*; Plan boundary Lines between . . . Maryland and three lower counties of Delaware with part . . . boundary between — and Penn. Facsimile of Map by C. Mason and Dixon, 77*; Sketch Map showing oil and gas fields, location of quadrangles and nature of geol. reports, 874*
- Masai, Die. Ethnographische Monographie eines ostafrikanischen Semitenvolkes. M. Merker, *rev.*, 928 ¶ Map: Allgemeine Übersichtsskizze der Wohngebiete des, 956*
- Masbate, Passages between Luzon and —, Chart U. S. Coast and Geod. Sur., 158*
- Mason, C., and J. Dixon. Facsimile of Parchment Map prepared by — Plan of Boundary lines between Maryland and three Lower Counties of Delaware, etc., 77*
- Mason, J. A. Myths of the Utah Utes, 221*
- Massachusetts: ¶ Description of Eastern Coast of the Country of Barnstable from Cape Cod to Cape Malebarre, etc., (Ja. (?) Treeman), 560*; Present Forest Problems of. A. Chamberlain, 948*; Reforestation of. F. W. Rane, 789*; Proceedings of Mass. Historical Society, Vol. XLIII, 236* ¶ Maps of Massachusetts: Map showing Quarrying Centers, 874*; Charts U. S. Coast and Geod. Sur.: Cape Cod Bay, 76*; Newburyport Harbor, 309*; Harbors of Plymouth, Kingston

- and Duxbury, 875*; Provincetown Harbor, 875*
- Massart, J. Esquisse de géographie botanique de la Belgique, *n.*, 144
- Massman, P. L. Mission an den Staatsposten von Belgisch-Kongo, 153*
- Masterman, E. W. G. Studies in Galilee, *rev.*, 209
- Masuren, West. Dr. C. Kob, *n.*, 144
- Matadi: Matadi-Leopoldville R. R., 620; Le Transafricain de — à Dar-es-Salaam. A. J. Wauters, 716*
- Matavanu in Savaii, Ascent of. T. Anderson, 225*
- Mather, Cotton, Diary of — 1681-1708. (W. C. Ford, *editor*), 560*
- Mathews, J. L. Conservation of Water, *rev.*, 306
- Mathews, R. H. Further Notes on Burial Customs, Australia, 156*
- Matthes, F. E., Personal, 529
- Matthews, L. K. Expansion of New England; Spread of Settlements and Institutions to the Mississippi River, 1620-1865, *rev.*, 531
- Matto Grosso: ¶ Le Matto-Grosso (Brésil), 223*; Reisen in — und Paraguay. C. Carnier, 869*
- Mattos, J. N. B. Dados climatológicos do Verão de 1908, 223*; Dados climatológicos do Anno 1909 (São Paulo), 790*
- Maudit, F. Cultivation of Trees in Argentina, 314*
- Maui Island, Kahului Harbor and Approaches, Chart U. S. Coast and Geod. Surv., 76*
- Maull, O. Grenzgürtel der nördlichen Kalkalpen, 397*
- Maurer, Dr. H. Gegen-azimutale winkeltreue Projektion, *n.*, 552; Isogonenkarte in besonderer Projektion, 799*; Kurze Charakteristik des Klimas der deutschen Schutzgebiete, 639*
- Mauritania: ¶ Du Guir à la Mauritanie. Le capitaine Doury, 476*; Pacification de la —. Col. Gouraud, 69*
- ¶ Maps of Mauritania: Région des puits d'Agamoun et des salines de N'Téret et Toudermi, 876*; Région des salines du Trarza occidentale, 876*
- Mauritius: Sugar Industry of (Cyclones, Sugar Cane and Insurance. A. Walter), 918 ¶ Map of Mauritius: Carte de l'île Maurice, 876*
- [Mawman, Joseph]. Picturesque Tour through France, Switzerland, etc., in 1816, 238*
- Mawson, Dr. D. Australasian Antarctic Expedition, 872*; —'s Antarctic Plans, 270, 921; South Polar Regions. With Antarctic Continent drawn to illustrate the probable topography as deduced from present available data; Supposed Antarctic Continent (Maps), *n.*, 712
- Mayr, Dr. H. Morphologie des Böhmerwaldes, 46, 397*
- Mazauric, F. Recherches spéléologiques dans le Département du Gard, 1904-9, 315*
- [Mazuchelli, N. E.] Indian Alps and How We Crossed Them. By a Lady Pioneer, 237*
- Mazzolani, D. A. Provincia dello Junnan, 637*
- Mecking, L. Über die ozeanographischen Ergebnisse der Ausreise . . . Planet, 317*
- Mecklenburg, Duke Adolphus Frederick of. In the Heart of Africa, *rev.*, 863; his Expedition in Africa, 855
- Mediterranean Regions: ¶ Anciens glaciers de la Corse et les oscillations pleistocènes de la Méditerranée. R. Lucerna, 560*; Beiträge zur Kenntnis der Höhengrenzen der Vegetation im Mittelmeergebiet. Dr. M. Koch, *n.*, 933; Classic Mediterranean. J. B. Devins, *n.*, 540
- Mediterranean Sea: ¶ Die dänische ozeanographische Expedition nach dem Mittelmeere, 1908-9. N. Mey, 228*; Sur les températures des grandes profondeurs particulièrement dans la Méditerranée. J. N. Nielsen, 794*
- ¶ Map of the Mediterranean: Campagne scientifique de la Princesse Alice, 234*
- Meinhard, F. Durch das Strumadefilee nach der bulgarischen Thermenstadt Küstendil, 315*
- Meinzer, O. E. Map of Southern Minnesota showing Occurrence of Granitic Rocks and Sioux Quartzite, 706*; Preliminary Report on Ground Waters of Estancia Valley, N. M., 221*; Topographic Map of Minnesota, 706; see also C. W. Hall, *joint author*.
- Mélia, G. Tabacs en Algérie, 69*
- Melland, F. H. Sketch Map of Southeast Corner of Bangweulu Swamps inhabited by Wa-Unga showing channels connecting Chambeshi and Lupula Rivers, 956*
- Mellish, H. The Present Position of British Climatology, 719*
- Melo, R. Navegacion en el Peru, 715*
- Mercadier, Lieut. M. De l'Atlantique au Tchad et au Borkou, 476*
- Mercalli, Prof. G. I Danni prodotti dai terremoti nella Basilicata e nelle Calabrie, *n.*, 145
- Mercantetti, Capt. N. Method for De-

- termining the Position of Vessel in Sight of Fixed Point, 470*
- Mercanton, Prof. P. L. *État actuel des études glaciaires*, 74*
- Merchier, A. *Colonies anglaises d'Afrique*, 68*
- Meredith, F. C. (*editor and compiler*). *Iti Dalan Ti Santa Nga Kruz* (The Way of the Holy Cross), 880*
- Merker, M. *Die Masai. Ethnographische Monographie eines ostafrikanischen Semitenvolkes*, *rev.*, 928
- Merlin, Gov.-Gen. *Situation générale de l'Afrique Equatoriale Française*, 154*
- Merriam, C. H., V. Bailey, and Others. U. S. Biol. Surv. Fourth Provisional Zone Map of North America, 707*
- Merriam, J. C. Tertiary Mammal Beds of Virgin Valley and Thousand Creek in N. W. Nevada, 313*
- Merzbacher, Dr. G. *Meine letzte Tianschan-Expedition, 1907-8*, 397*; *Über Verlauf und Ergebnisse meiner neuen Forschungsreise in*, 397*; *Wiss. Erg. Merzbacherschen Exp.* P. Gröber, *n.*, 66
- Mesopotamia: ¶ *Die künstliche Bewässerung Babylonien's*. K. Ch. Christiansen, 155*; *Meine Expedition durch Vorder-Asien*. Dr. H. Grothe, 870*; *Reisebilder aus Mesopotamien und Kurdistan*. Dr. H. Frh. v. Handel-Mazzetti, 557* ¶ *Maps of Mesopotamia*: Ewald Banse's *Reise im nördl. Mesopotamien*. 1908, *n.*, 310; *Studie zu Dr. V. Pietschmanns photographischen Aufnahmen in*. I. Tschamler, *n.*, 960
- Messina: *Catastrofe sismica Calabro Messinese*. M. Baratta, *n.*, 145
- Meteorites: ¶ *Abundance of Meteorites on Painted Desert, and its Bearing upon the Planetesimal Hypothesis of the Origin of the Earth*. C. R. Keyes, 560*; *Altai Meteorite*, 1904. [In Russian.] V. N. Mamontov, 74*; *An Australian*, —. L. L. Smith, 156*; *Meteorite Studies*. O. C. Farrington, 318*
- Meteorology. See also Atmosphere, Temperature, Climate, etc.: ¶ *Brief List of Meteorological Text-Books and Reference Books*. C. F. Talman, *n.*, 220; *Centers of Action and Seasonal Weather*, 371; *Descriptive Meteorology*. W. L. Moore, *rev.*, 386; — at the Intern. Amer. Scien. Congress, Buenos Aires. R. C. Mossman, 317*; *Instruction in*. F. V. Emerson, 452; *Meteorbeobachtungen auf See*. Dr. J. Plassmann, 794*; *Météorologie*, 479*; *Meteorology Practical and Applied*. Sir John Moore, Sec. Ed., *rev.*, 465; *Origin of Permanent Ocean Highs*. W. J. Humphreys, 953; *Registering Balloon Ascents*, Dec., 6-11, 1909 and Aug. 8-13, 1910. W. H. Dines, 640*; *Status of Modern*. —. F. H. Bigelow, 399* ¶ *Meteorological Map*: Map showing positions of meteorological stations [Europe] observations from which are used in preparation of [United Kingdom] daily Weather reports, *n.*, 80; 958*
- Mettrier, H. *Le Col du Pelvoux*, 71*
- Meuleman, Prof. Bericht über die wichtigsten Faktoren der Akklimatisation europäischen Viehes in warmen Ländern, 399*; *Facteurs essentiels de l'acclimatation du bétail européen dans les pays chauds*, 479*
- Meunier, A. *Carte de la Côte Française des Somalis et Régions avoisinantes*, *n.*, 797
- Mexico, General: ¶ *Album Pintoresco de la Republica Mexicana*, 400*; *Barbarous Mexico*. J. K. Turner, *rev.*, 140; *Determinaciones magneticas en la Republica*, 152*; *Notes on Southern*. —. G. N. Collins and C. B. Doyle, 635*; *Our Neighbor*, —. J. Birkinbine, 868*; *Oeuvre géographique d'Alexandre de Humboldt*. E. Oberhammer, 636*; *Studies of Mexican and Central American Plants*. J. N. Rose, 636*; *Terremotos del Año de 1908*. M. Miranda y Marrón, 152* ¶ *Economic: Agricultural Possibilities in tropical*. —. Dr. P. O. Seffer, 395*; *Boletín de Estadística Fiscal, 1909-10*, 475*; *Histoire de la cochenille au Mexique*. L. Digue, 554*; *Kautschukkultur in*. H. J. Ludewig, 67*; *Population of*, 620 ¶ *Historical: Carácter de la Conquista Española en América y en México, según los textos de los Historiadores Primitivos*. G. García, 480*; *Historia Verdadera de la Conquista de la Nueva España por Bernal Díaz del Castillo uno de sus Conquistadores*. G. García, 480*; *Life and Times of Miguel Hidalgo y Castilla*. A. H. Noll, *rev.*, 374; *Mexico durante su guerra con los Estados Unidos*. José Fernando Ramírez. *Documentos inéditos* . . . pub. por G. García, 480*; *Notes sur la Médecine et la Botanique des anciens Mexicains*. A. Gerste, 395*; *Spanish Conquest in — and its Relation to History of Slavery, etc.* A. Helps, 318*; *Tumultos y Rebeliones*

- Acácidos en México. Documentos inéditos pub. por G. García, 480*; Su virreinato en la Nueva España, etc. Don Juan de Palafox y Mendoza. Documentos inéditos . . . pub. por G. García, 480* ¶ Maps of Mexico: Carta de la región abarcada por el temblor del 26 de Marzo de 1908. J. F. Romani, 159*; Croquis geológico y topográfico del Valle de Ixmiquilpan, 231*; Linguistic Map of Mexico and Central America. (Bur. of Amer. Ethnol. Map.) C. Thomas and J. R. Swanton, 706*; Map of —. J. G. Bartholomew, n., 634*; Meteorological Maps of, n., 876
- Mey, Dr. N. Die dänische ozeanographische Expedition nach dem Mittelmeere, 1908-9, 228*; Passatwinde des Atlantischen Ozeans, 640*
- Meyer, Dr. G. Geographische Verbreitung der Schlafkrankheit, 318*
- Meyer, Dr. H. His Donation for Professorship of Colonial Geography, 60; Returns to German East Africa, 288, 526
- Meyers Grosses Konversations-Lexikon, Sechste Aufgabe, 320*
- Michaelsen, Dr. H. Kalkpfannen des östlichen Damaralandes, 154*
- Michaux, André, Voyage d' — en Syrie et en Perse (1782-85) d'après son journal et sa correspondance. Dr. E. T. Hamy, 870*
- Michel, G. Maps accompanying "Coudes de Capture" du pays fribourgeois, 959*
- Michie, A. Siberian Overland Route from Peking to Petersburg, etc., 237*
- Michieli, A. Jean Brunhes e l'opera sua, 639*
- Michigan: ¶ Establishment of —'s Boundaries: Study in Historical Geography. G. J. Miller, 339; Michigan and Its Resources. Compiled by F. Morley, 236*; Results of Spirit Leveling in — and Wisconsin, 1897-1909. R. B. Marshall, 789* ¶ Maps of Michigan: Calumet Special Map, 629*; Fowlerville Quad., 75*
- Michow, H. Zur Geschichte der Bekanntschaft mit Sibirien vor Jermak, 224*
- Mielert, F. Insel Korsika, 315*
- Mikkelsen, Kaptajn Einar —'s Ekspedition. Lieut. W. Laub, 228*
- Miles, A. H. Agricultural Labour Conditions in Jamaica, 475*
- Miles, Lieut.-Col. S. B. On Border of Great Desert: Journey in Oman, 70*
- Milford, J. J. Observations, Moral, Literary and Antiquarian . . . Pyrenees, South of France, etc., 1814-15, 238*
- Mill, Dr. H. R. British Rainfall, 1908-1909, *rev.*, 539; *British Isles. Mean Annual Rainfall* (Map), n., 551; Guide to Geographical Books and Appliances, n., 942
- Mill, Lieut.-Col. H. La mise en valeur du Territoire du Tchad, 223*
- Miller, B. L. Mineral Paints, 789*
- Miller, G. J. Establishment of Michigan's Boundaries: Study in Historical Geography, 339
- Mills, J. C. Our Inland Seas, *rev.*, 139
- Milne, J. Recent Earthquakes, 640*
- Milne, Mrs. L. Shans at Home, *rev.*, 864
- Minas Geraes: Map of Bagagem Valley, 955*
- Mindoro, Southwestern Luzon and —, Chart U. S. Coast and Geod. Surv., 158*
- Minerals: La Conquête minérale. L. de Launay, *rev.*, 217; Recognition of Minerals. C. G. Moor and D. A. McAlister, *rev.*, 149
- Minerva, 1910-1911, 480*
- Minnesota: ¶ Prairie Flora of Southwestern —. L. R. Moyer, 714*; Prevention of Forest Fires in. Gen. C. C. Andrews, 474*; Results of Spirit Leveling, 1897 to 1910. R. B. Marshall, 635* ¶ Maps of Minnesota: Barrett and Herman Quadrangles, 389*; Map showing stages of recession in the ice in, 954*; Maps of southern — showing Occurrence of Granitic Rocks and Sioux Quartzite. O. E. Meinzer, 706*; Thickness and Character of Surface Deposits. C. W. Hall, O. E. Meinzer and M. L. Fuller, 706; Underground Water Conditions. C. W. Hall, O. E. Meinzer and M. L. Fuller, 706*; Topographic Map of Southern —. O. E. Meinzer, 706
- Minnesota R. Drainage Basin. R. Follansbee, A. H. Horton and R. H. Bolster, 867*
- Minnewanka Lake Section. H. W. Shimer, 949*
- Miranda y Marrón, M. Los Terremotos del Año de 1908 [Mexico], 152*
- Mississippi: ¶ Cement and Portland Cement Materials of. A. F. Crider, 880* ¶ Maps of Mississippi: Coahoma, Dundee, Jonestown, and Walnut Lake Quadrangles, 75*; Map showing production of cotton in 1909, 229*; Soil Survey Map of Clay Co., 229*

- Mississippi R. Drainage Basin, Upper. R. A. Follansbee, A. H. Horton and R. H. Bolster, 789*; Rhine and — Terminals. E. J. Clapp, 714*; World's Great Rivers. The Mississippi. R. M. Brown, 47*.
- Misson, L. L'élevage dans l'État de São Paulo, 950*.
- Missouri: ¶Antiquities of Central and S. E. — G. Fowke, 474*; Geology and Mineral Resources of St. Louis Quadrangle. N. M. Fennerman, 788*; Results of Spirit Leveling, 1896 to 1909. R. B. Marshall, 367* ¶Maps of Missouri: Archaeological Sites in. G. Fowke, 158*; Atchison Co. Soil Survey, 77*; Geol. Map of the St. Louis Quad., 544; Higdon and Macon Quadrangles, 75*; Leavenworth Quad., 75*.
- Missouri River and Its Future Importance to the Nations of Europe. L. A. Owen, 948*.
- Mistassini, Région de. E. Rouillard, 152*.
- Mitchell, G. E. American Potash Industry, 789*; New Source of Power [Lignite], 72*; Our Greatest Plant Food [Phosphates], 317*.
- Mitteilungen des Sächsisch-Thüringischen Vereins für Erdkunde zu Halle, 227*.
- Mobile River Drainage Basin, 394*.
- Modena, Map, n., 311.
- Moffit, F. H. Mining in Chitina District, 394*; — and S. R. Capps. Geol. Map of Nizina District, Alaska, 874*.
- Mogador, le dernier Port ouvert du Maroc sur l'Atlantique. J. du Taillis, 790*.
- Moisel, M., joint author, see P. Sprigade.
- Moldenke, R. Coke Industry of the U. S., 221*.
- Molengraaff, Dr. G. A. F. Gold-industrie in Surinam, 223*.
- Moll, Col. Les Événements du Ouadai et la Mort du —. R. de Caix, 224*.
- Moluccas, Map of Amboina and the —, 472*.
- Monaco, Prince Albert 1^{er} de. Sur la dixième campagne de la Princesse-Alice II, 399*; — douzième —, 872*.
- Monagas, Venezuela, Centros Pecuarios del Estado — (Map), 876*.
- Mongolia: ¶Explorations in. D. Caruthers, 396*; Mongolia-Sze-Chuan Exp. of Imp. Russian Geog. Soc. Col. P. K. Kozlov, 396*; Spedizione nella Mongolia e nel Secuian. P. Kozlov, 951*; Aux Ortos. P. A. Boty, n., 64; Tramps in Dark Mongolia. J. Hedley, rev., 209 ¶Map of Mongolia: Mongolie. Atlas Universel de Géographie. V. de Saint-Martin et Fr. Schrader, n., 312.
- Monod, Th. Des facteurs de l'acclimatation du bétail européen en Algérie et dans les pays chauds, 314*.
- Monongahela Basin, Denudation and Erosion in Southern Appalachian Region and —. L. C. Glenn, 635*.
- Monroe, W. S. Bohemia and the Čechs, n., 144.
- Montana: ¶General Part of Bull Mountain Coal Field. R. W. Richards, 221*; Eastern Part of the. C. T. Lupton, 867*; Fort Peck Indian Reservation Lignite Field. C. D. Smith, 221*; Glacier National Park, 366; Graphite near Dillon. A. N. Winchell, 867*; Milk R. Coal Field. L. J. Pepperberg, 221*; Notes on Coals of the Custer National Forest. C. H. Wegemann, 222*; Origin of Cliff Lake. Prof. G. R. Mansfield, 553*; Phosphates in. H. S. Gale, 313*; White Pines of — and Idaho.—Their Distribution, Quality and Uses. F. I. Rockwell, 867* ¶Maps of Montana: Map of Northeastern Part of Bull Mountain Coal Field. C. T. Lupton and H. Hinds, 630*; Reconnaissance Geol. Map of Elkhorn Mts., 874*; Sheridan Quad., 874*.
- Montauk Point to New York and Long Island Sound, Chart U. S. Coast and Geod. Surv., 309*.
- Mont Blanc: ¶Description des Aspects du — . . . Présenté à Sa Majesté le Roi de Sardaigne. M. T. Bourrit, 320*; Some Climbs on the South Side of. H. O. Jones, 793*; Jacques Balmat, or, The First Ascent of —. A True Story, T. L. Oxley, 239* ¶Map of Mont Blanc: Carte Albert Barbey. La chaîne du Mont-Blanc. X. Imfeld et L. Kurz, n., 551.
- Montenegro: ¶Au Montenegro et en Albanie. Baron J. de Witte, 315*; Die räumliche Entwicklung Montenegros. Dr. K. Hassert, 315*; Wanderung durch das östliche Bosnien, — und Albien. L. Edlinger, 477* ¶Map of Montenegro: Monténégro, 959*.
- Montreal R. District. W. H. Collins, 948*.
- Moon: Erdbild in Mondentfernung. W. Krebs, 953*.
- Moor, C. G., and D. A. McAlister. Recognition of Minerals, rev., 149.
- Moore, Sir John. Meteorology Practical and Applied, Sec. Ed., rev., 465.
- Moore, W. L. Descriptive Meteorology, rev., 386.

- Moravia: ¶ Niederschlag, Abfluss und Verdunstung im Marchgebiete. Dr. E. Stummer, 397*
- Moret-sur-Loing, Dunes continentales de — front oriental de la forêt de Fontainebleau. C. Duffart et F. Bergeron, 718*
- Morin, D. Monographie de la commune de Saint-Palais-sur-Mer, 871*
- Morrisseau, Comm. J. Sur les hauteurs du Katanga du lac Moero à Lukafu, n., 695
- Moritz, Prof. Dr. E. Reisestudien aus Südwest-Afrika, 791*; Tirashochfläche, 396*
- Morley, F. Michigan and its Resources, 236*
- Morley, S. G. Ancient Temples and Cities of the New World. Uxmal the City of Xius, 635*; Copan, the Mother City of the Mayas, 789*
- Morocco: ¶ Amalat d'Oujda. Étude de géographie physique. L. Gentil, 790*; Commerce extérieur du Maroc. L. Gentil, 790*; Derniers développements de l'affaire marocaine. R. de Caix, 951*; Étude d'une zone frontière. Confins algéro-marocains. E. Bernard, 790*; Journal du corps de débarquement de Casablanca à travers la Chaouia. Capt. Grasset, 869*; Une leçon de géographie physique sur le Maroc. L. Gentil, 476*; Maroc Occidental. A. Lecocq, 869*; With Mulai Hafid at Fez. Behind the Scenes in L. Harris, *rev.*, 459; Mysterious — and how to Appreciate It. H. J. B. Ward, n., 304; Notes sur le Haut Ziz. M. Oustry, 476*; Notes sur l'Oued Gheris et ses affluents. M. Bernard, 476*; L'œuvre française dans les Confins Algéro-Marocains et ses Résultats politiques. A. Bernard, 223*; Œuvre de la Mission hydrographique du Maroc. H. Froidevaux, 790*; Quelques rectifications à la carte du Maroc. Vallée de la Moulouya. A. Bernard, 556*; Région de Tafraata et les tribus qui l'habitent. Lieut. Lefèvre and Nehlil, 69*; Relation de l'Origine et Succès des Cherifs et de l'Etat des Royaumes de Maroc, Fez, et Tarvadt, etc. Faicte & écrite en Espagnol par Diego de Torrès. Mise en Français par M. C. D. V. D. D. A. (1636), 480*; Résumé de nos rapports avec les représentants du Maghzen et les populations de la zone frontière orano-marocaine. Capt. Mougin, 476*; Situation économique du Maroc, 1908-9. René-Leclerc, 476* ¶ Maps of Morocco: Deutsche Ansprüche an Marokko, 877*; Frontière Orano-Marocaine septentrionale, 708*; Atlas Univ. de Géog. V. de Saint-Martin et Fr. Schrader, n., 312; Maroc au 500,000^e, État d'avancement des travaux, 1909, 708*; Région de Casablanca, n., 391; Zone de 10 Kilomètres autour de Tétouan, 472*; Zones pacifiées de 1903 à 1910, 707*
- Morphology: Méthode de l'échantillonnage topographique au service de la morphologie. Prof. J. Brunhes, 74*
- Morrill, W. J. Fixation of Dunes on the Coast of Jutland, 718*
- Morris, C. Industrial and Commercial Geography, *rev.*, 385
- Morris, M. O'Connor. Rambles in Rocky Mts., 400*
- Moselgebiet, Morphologie des — zwischen Trier und Alf. Dr. B. Dietrich, 478*
- Mosi-Oa-Tunga, Wonders of: The Falls of the Zambezi. L. L. Seaman, 951*
- Mossman, R. C. Interdiurnal Variability of Temperature in Antarctic and Sub-Antarctic Regions, 58; Meteorology in Weddell Quadrant during 1909, 72*; Meteorology at Intern. Amer. Scient. Congress, Buenos Aires, 1910, 317*; Present Position of Antarctic Meteorology, 228*
- Moszkowski, M. Vorläufiger Bericht über die Deutsche Mamberamo-Exped. in Nied.-Neu-Guinea, 557*
- Mougin, Capitaine. Résumé de nos rapports avec les représentants du Maghzen et les populations de la zone frontière orano-marocaine, 476*
- Mountaineering: ¶ Adventures on the Roof of the World. Mrs. Aubrey Le Blond, 320*; Ascensions nouvelles dans le Dauphiné. E. Santi, 793*; Alpinisme sans guide. E. Canzio, 318*; Les Alpes et les grandes ascensions. E. Levasseur, 238*; British Mountain Climbs. G. D. Abraham, n., 701; The Call of the Snowy Harper. W. H. Hunter, *rev.*, 929; Some Climbs on the South Side of Mont Blanc. H. O. Jones, 793*; Hochtouren in den Alpen, Spanien, Nordafrika, Kalifornien und Mexico. R. Schäfer, 320*; Swiss Mountain Climbs. G. D. Abraham, n., 701; Jahrbuch des Schweizer Alpenclub, 1910-11, 880*; Jacques Balmat, or, The First Ascent of Mont Blanc. A True Story. T. L. Oxley, 239*; Klubbhütten des Schweizer Alpen-Club, 880*; Register of the Appalachian Mountain Club for 1911, 789*

- Mountain Passes: ¶ Studien über Gebirgspässe mit besonderer Berücksichtigung der Ostalpen. Dr. J. Sölch, 602
- Mountain Pastures: ¶ Surcharge des pâturages et l'aménagement des montagnes. P. Descombes, 72*
- Mountains: ¶ Bergzeichnung auf den älteren Karten. J. Röger, 480*; Les Montagnes. A. Dupaigne, 239*; The Story of the Hills. Popular Account of the Mountains and How They were Made. H. N. Hutchinson, 239*
- Mount Desert Island. Frenchman's and Blue Hill Bays, Chart U. S. Coast and Geod. Surv., 76*
- Mount McKinley Region, Maps: ¶ Geol. Reconnaissance Map of region. A. H. Brooks and L. M. Prindle, 795*; Reconnaissance Map of, 795*; Sketch Map showing Distribution of Timber, 795*
- Mount Robson, Attempt on. L. S. Amery, 222*
- Moyer, L. R. Prairie Flora of South-western Minnesota, 714*
- Mozambique, Impressions and Scenes of. O. W. Barrett, 224*
- Mudie, R. China and Its Resources, Peculiarities, etc. . . . Opium Question and Notice of Assam, 237*
- Mugnier-Pollet, Lieut. De l'Adrar à la Baie du Lévrier, 556*
- Muir, J., joint author, see J. Burroughs and I. C. Rosse.
- Mullan, J. Miners' and Travelers' Guide to Oregon, Washington, Idaho, etc., 400*
- Müller, A. Unterricht in der mathematischen und astronomischen Geographie nach Umfang und Methode, 318*
- Müller, Dr. E. Volksdichtekarte von Neu-Vorpommern und der Insel Rügen; Grösse und Lage der Wohnplätze von —, 710*
- Müller, F. Zur Geschichte und Natur der Schelde-Mündungen in der Niederländischen Provinz Zeeland, 952*
- Müller, J. W. von. Reisen in den Vereinigten Staaten, Canada, und Mexico, 319*
- Müllers, Andreas. Monumenti Sinici, quod Anno Domini MDCXXV terris in ipsâ Chinâ erutum, etc., 237*
- Mumm, A. L. Five Months in the Himalaya, 319*
- Mundy, F. W. Earning Power of Railroads, 1909 (Compilation), n., 218
- Muni, Territorios Españoles del. E. López Perea, 224*
- Municipal Trading, Dangers of. R. P. Porter, n., 943
- Munich: ¶ Beziehungen zwischen Regenfall u. Quellergiebigkeit, unter besonderer Berücksichtigung der Münchener Wasserversorgung und der Kissinger Quellen. Dr. L. Frank, 871*
- Munro, I. Narrative of Military Operations on the Coromandel Coast, against the combined forces of the French, Dutch, and Hyder Ally Cawn, from . . 1780 to the peace in 1784, 480*
- Munro, J. E. C. Constitution of Canada, 319*
- Muret, E. Orthographie des noms de lieu de la Suisse Romande, 478*; see also F. A. Forel, joint author.
- Murman Coast: ¶ Murmanische Küste. H. Rottmann, 719*; *Rybnyaia Promysli Murmana i yevy Kolonizatsia* [Fishes and Colonization]. Vs. Drzevicki, 316*
- Murray and Darling Rivers, Sketch of — showing position of gauging stations and the southern border of artesian area, 798*
- Murray, J. Scientific Work of the British Antarctic Expedition, 1907-9, 72*; British Antarctic Expedition, 1907-9. Editor Reports of scientific investigations. Vol. I. Biology, *rev.*, 145
- Murray, Sir John. Alexander Agassiz: His Life and Scientific Work, 794*; The Deep Sea, 119; Personal, 529; — and L. Pullar. Bathymetrical Survey of the Scottish Freshwater Lochs, conducted under the direction of — during 1897 to 1909, 320*
- Musil, Dr. A. Explorations in Arabia, 137
- Muss-Tau, The Glacial Group of. [In Russian.] Bl. Riezniczenko, 224*
- Muszynski, Oberstleut. O. Gebirgspässe des Chanats Buchara. Nach russischen Quellen, 951*
- Myres, Prof. J. L. Greek Lands and the Greek People, 558*
- Mysia: Das westliche Mysien und die pergamenische Landschaft. Dr. A. Philippson, 951*

N.

- Naegi, Province Mino, Geol. Map showing Distribution of Stream-Tin in Environs of the Town of, 877*
- Naga Tribes of Manipur. T. C. Hodson, *rev.*, 698
- Nakamura, S., and K. Honda. Seiches in Some Lakes of Japan, 717*
- Namib, Erforschung der. Dr. Klein-kemmer-Kettwig, 69*

- Nansen, Dr. Explains Amundsen's Advent in the Antarctic, 451
- Nantucket Shoals, Chart U. S. Coast and Geod. Surv., 545*
- Nash, W. L., *Compiler*. Egypt Exploration Fund. General Index to Archaeological Reports. Vols. I-XVIII, 960*
- Natal, Catalogue of Collection of Rocks and Minerals from — and Zululand arranged stratigraphically. F. H. Hatch, 555*; Report of Mining Industry, 1909. C. J. Gray, 396*
- Nations, Culture of the. M. Jefferson, 241; Ruling Nations; Considerations on Their Characters. V. Dingelstedt, 872*
- Navaho National Monument, Prel. Report on a Visit to. J. W. Fewkes, 788*
- Navigation: ¶Method for Determining the Position of Vessel in Sight of Fixed Point. Capt. N. Marcantetti, 470*; Model Experiments on Suction of Vessels. E. W. Taylor, Reverse Pilot Chart of North Atlantic Ocean, 545*; Nautical Science in its Relation to Practical —, together with Study of Tides and Tidal Currents. C. L. Poor, *rev.*, 469
- Naville, E. Le commerce de l'ancienne Égypte avec les nations voisines, 869*; — and S. Clarke. Egypt Exploration Fund. Thirtieth Memoir; The XIth Dynasty Temple at Deir El-Bahari, Part II, 236*
- Nebraska: ¶Geographic Influences in the Development of. G. E. Condra, 221*; Kansas and — Handbook for 1857-8. N. H. Parker, 236*; Kansas and — Results of Spirit Leveling in, 1896-1909. R. B. Marshall, 948*; Outline of History. A. Watkins, 553* ¶Map of Nebraska: Outcrop Area of Niobrara formation in South-Central, 229*
- Negros and Cebu. Northern part of Tañon Strait, Chart U. S. Coast and Geod. Surv., 309*
- Negros and Vicinity, Harbors in. Charts U. S. Coast and Geod. Surv., 632*
- Nehlil, *joint author*, see Lieut. Leffèvre.
- Nelson, E. W. Land of drought and Desert—Lower California, 868*
- Nemry, L. Les possessions allemandes dans la mer du Sud, 557*
- Netherlands: ¶Colonisation chez les Hollandais. J. Leclercq, 398*; Dutch Republic and American Revolution. F. Edler, 800*; Hollandsche Duinen, Grondwater en Bodemdaling. E. Du bois, 719*; Morphologische Bau des niederländischen Diluviums nördlich vom Rhein. J. van Baren, 71* ¶Maps of the Netherlands: Das heutige Zeeland nach Kuijper, 711*; Historische Karte von Zeeland nach Utrecht Dresselhuis, 711*; Overzichtskaat van de not heden bekende Veenbruggen in Nederland en N. W. Duitschland, 959*
- Nettancourt-Vaubecourt, J. de. Sur les grandes routes de l'Asie Mineure, *n.*, 65
- Neuchâtel: Évolution de la Flore neuchâteloise. H. Spinner, 478*
- Neu-Hannover, Höhenschichtenkarte und Geol. Kartenskizze von. Dr. K. Sapper, *n.*, 232
- Neu Mecklenburg, Maps: Höhenschichtenkarte u. Geol. Kartenskizze von Nord; von Süd. Dr. K. Sapper, *n.*, 232; Übersichtskarte von — u. den Nachbargebieten . . . Lage bekannt gewordenen Terrassen. Dr. K. Sapper, *n.*, 232; Übersichtsk. der ungefähren Volksdichte auf — u. den Nachbargebieten. Dr. K. Sapper, *n.*, 232; Verbreitung der Vegetationsformationen auf — u. Nachbargebieten. Dr. K. Sapper, *n.*, 232
- Neuse, Dr. R. Landeskunde von Frankreich, *n.*, 383
- Nevada: ¶Geology and Oil Prospects in Reno Region. R. Anderson, 474*; Tertiary Mammal Beds of Virgin Valley and Thousand Creek in N. W. Nevada. J. C. Merriam, 313*; Two Areas of Oil Prospecting in Lyon Co. R. Anderson, 313* ¶Maps of Nevada: Carson Sink Quad., 75*; Furnace Creek Quad., 75*; Hawthorne Quad., 873*; Sketch map of portion of west-central, 874*
- Neve, Dr. A. Sketch Map to illustrate explorations of — in the Himalayas, 957*
- Newark Bay, Chart U. S. Coast and Geod. Surv., 76*
- Newbigin, Dr. M. L. Modern Geography, *rev.*, 942
- New Brunswick: Tobique District. G. A. Young, 949* ¶Map of New Brunswick: Prince Edward Island, Nova Scotia and New Brunswick. R. E. Young, 78*
- Newburyport Harbor, Chart U. S. Coast and Geod. Surv., 309*
- New Caledonia: ¶Statistiques du Commerce, 1908. Nouvelle Calédonie et Dépendances, 792*; Statistiques de l'industrie minière . . . 1908, 558*

- Exploitation du Chrome de 1900 à 1908, 718*
- Newcombe, A. C. Village, Town and Jungle Life in India, 319*
- Newell, F. H. Reclamation of Arid West, 714*
- New England: ¶Expansion of New England: The Spread of Settlements and Institutions to Mississippi River, 1620-1865. L. K. Matthews, *rev.*, 531; Occurrence and Composition of Well Waters in Granites of. F. G. Clapp, 635*
- Newfoundland, Five Months in Labrador and —, during the summer of 1838. E. W. Tucker, 480*
- New Guinea: ¶Exploration of, 687; German-Dutch Boundary Expedition in, 369; Vingeramutatie in Centraal Nieuw-Guinea. J. C. van Erde, 638*
British New Guinea: See Papua.
Dutch New Guinea: ¶Explorations in. Dr. Lorentz's Ascent of Wilhelmina Peak, 837; Expedition to the Snow Mountains of. H. A. Lorentz, 718*, 952*; Iles Arou et Kei. Dr. J. Roux, 156*; Capt. Koch's Explorations in W. New Guinea, 857; Woordenlijst verzameld op de Mimika en Atoeka-Rivieren. J. M. Dumas, 156*; Vorläufiger Bericht über die Deutsche Mamberamo-Exp. in Nied.-Neu-Guinea. M. Moszkowski, 557*; Wetenschappelijke uitkomsten der Mamberamo-Expeditie 1909-10, 718*
¶Maps of Dutch New Guinea: Aanvullings en Verbeterblad van Zuid-Nieuw-Guinea, 160*; Map to illustrate the Expedition of H. A. Lorentz in 1907-9, 472*, 710*; De Mamberamo-Rivier, *n.*, 550; Part of — to illustrate explorations of Capt. C. G. Rawling, etc., *n.*, 878; Schetskaart van het Sentani-Meer, Noord Nieuw-Guinea. F. J. P. Sachse, *n.*, 957*
German New Guinea: See also Kaiser Wilhelmsland: ¶Erdbeben-tätigkeit in Deutsch Neuguinea. A. Sieberg, 226*; Fortführung des Gutta-percha und Kautschuk-Unternehmens und Reisbauversuche in Neu Guinea, 226*; Gemüsekultur in den Tropen, 397*; In das Hinterland der Nordküste des Kaiser Wilhelmslandes. Dr. G. Friederici, 156*; Keizerin Augusta-Rivier, *n.*, 392
- New Hampshire: ¶Forestry Progress in. W. R. Brown, 474*; Petrography of Tripyramid Mountain. L. V. Pirson, 789*; Some Ore Deposits in Maine and the Milan Mine. W. H. Emmons, 313*; Results of Spirit Levelling in Maine, New Hampshire, etc., 1896-1909. R. B. Marshall, 66*
¶Maps of New Hampshire: Fryeburg, Quad., 873*; Kames of Maine and S. E. New Hampshire, 954*; Soil Survey map of Nashua area, 158*
New Hanover, Bismarck Archipelago. See Neu Hannover.
- New Haven Harbor, Conn., Chart U. S. Coast and Geod. Surv., 631*
- New Hebrides, Dr. F. Speiser's Ethnological Investigations in, 857
- New International Year Book . . . 1910. F. M. Colby, *editor*, 560*
- New Jersey: ¶Annual Report of State Geologist for 1909, 152*; New Jersey and Forestry. G. E. Lyon, 221*; Notes on Mineral Industry. H. B. Kümmel, 714*
¶Maps of New Jersey: Greenwood Lake Quad., 75*; Ramapo Quad., 75*; Charts U. S. Coast and Geod. Surv.: Passaic R., Newark Bay to Belleville, 76*; Raritan River from — Bay to New Brunswick, 309*
- Newland, D. H. Map of New York showing distribution of Salina Strata, *n.*, 230; — and H. Leighton. Gypsum Deposits of New York, 66*
- New Mecklenburg. See Neu Mecklenburg.
- New Mexico: ¶Carthage Coal Field. J. H. Gardner, 313*; Coal Field between San Mateo and Cuba. J. H. Gardner, 313*; Investigations of Coal Fields in Colorado and — in 1909. G. C. Martin, C. W. Washburne and Others, 151*; Isolated Coal Fields in Santa Fé and San Miguel Cos., J. H. Gardner, 151*; Preliminary Report on Ground Waters of Estancia Valley. O. E. Meinzer, 221*; The Type Localities of Plants first described from. P. C. Stanley, 394*
¶Maps of New Mexico: Estancia Valley showing Depth and Quality of Ground Waters, 954*, — showing Physiography and Pleistocene and Recent Geology, 954*; location of Estancia, Encino and Pinos Wells Basins, 954*; Fort Bayard Special Map, 308*; Geol. Map of Part of N. W. —. N. H. Darton, 157*; Map of —, showing Locations and Names of Metal Mining Districts, 157*; Map showing geol. relations of fissure veins near Pinos Altos, 874*; Map of New Mexico, *n.*, 158; Reconnaissance Geol. Map of Ancient Lake Bed in Encino Basin, 954*
- New South Wales: ¶Brief Review of Fisheries in. D. G. Stead, 477*; Geology of Murrumbidgee R. District, near Yass. L. F. Harper, 477*; La

- Nouvelle-Galles du Sud. P. Privat-Deschanel, 397*; Rainfall in. H. A. Hunt, 527; Records Geol. Survey, 557*
 ¶ Maps of New South Wales: Geol. Map of Forbes-Parkes Gold Field, 957*; Plan Showing Allan Cunningham's Route and Site of First recorded discovery of Gold in Australia, 957*
 New York City: ¶ History of the City of — 1609-1909. J. W. Leonard, 236*; Landmarks of Old New York. E. Greatorex, 236*; The Real New York in 1910. M. Jefferson, 737 ¶ Maps of New York City: Free Public Educational Institutions of — in 1911, 955*; New Standard Map of Greater New York, *n.*, 795
 New York State: ¶ Birds of. E. H. Eaton, 960*; Calcites. H. P. Whitlock, 960*; Geographical Influences in Development of. R. H. Whitbeck, 475*; Geology of New York City (Catskill) Aqueduct. C. P. Berkey, 553*; Geology of Poughkeepsie Quad. C. E. Gordon, 867*; Gypsum Deposits of. D. H. Newland and H. Leighton, 66*; Historical Collections of. J. W. Barber and H. Howe, 236*; History of Purchase and Settlement of Western — and Rise, Progress, . . . Presbyterian Church in that Section. J. H. Hotchkiss, 236*; Minutes of Executive Council of the Province of New York. Administration of Francis Lovelace, 1668-1673 . . . portrait, facsimiles, etc., from original MS. in the British Museum. V. H. Paltsits, *editor*, Vol. I, 319*; Vol. II, 560*; Proceedings of the Seventieth Ann. Meeting of N. Y. State Agricultural Soc., 789*; Railroad Distances in New York. A. E. Parkins, 26; Report of State Entomologist on Injurious and Other Insects of, 1909, 152*; 1910, 554*; Report of the — State Museum, 1909, Vols. I and II, 960*; Topographic Map of, 854 ¶ Maps of New York State: Antwerp Quad., 873*; Bath and Stony Creek Quadrangles, 75*; Distribution of Salina Strata. D. H. Newland, *n.*, 230; Greenwood Lake Quad., 75*; Monticello Quad., 629*; Neversink Quad., 389*; Geol. Map of Poughkeepsie Quad., *n.*, 546; Ramapo Quad., 75*; Map of western — showing distribution of moraine deposits, 954*; Revised Areal Geol. of Southern Manhattan Island and adjacent margin of Long Island, 390*; Sketch Map of Catskill and Croton Water Supply Systems, 390*; Geol. Formations along the proposed lines for distribution conduits, 390*; Sketch Map of S. E. Adirondack region showing relation of pre-Glacial drainage to that of the present, 795*; Sketch Map showing oil and gas fields, location of quadrangles and nature of geol. reports on each, 874*; Soil Survey of Washington Co., 389*; Charts U. S. Coast and Geod. Survey: Huntington Bay, L. I. Sound, 309*; Montauk Point to New York and L. I. Sound, 309*; North Shore Long Island Sound. Rhineck to New Rochelle, 76*
 New Zealand: ¶ An Anomalous Island. C. de Thiery, 557*; Flower-Hunter in Queensland and New Zealand. Mrs. Rowan, 319*; Glaciation of. P. Marshall, 70*; Great Ice Age of. Prof. J. Park, 70*; La Nuova Zelanda (Una Italia Australe). G. Capra, 718*; Official Year-Book 1910, 792*; Origins of the New Zealand Nation. G. H. Scholefield, 718*; Terra Nova as a Survey Ship, 622 ¶ Map of New Zealand: North Island: South Island. Shows Land Transactions, 1909-10, 232*
 N'Goindé, Exploration de la rivière —. E. Mallet, 476*
 Niagara Falls: ¶ L'évolution des chutes du Niagara. J. W. Spencer, 66*; Relative Work of the Two Falls. J. W. Spencer, 714* ¶ Map of, 876*
 Niagara River, Relationship of — to Glacial Period. J. W. Spencer, 151*, 714*
 Nicaragua, Archaeological Researches in. J. F. Bransford, 720*
 Nickles, J. M. Bibliography of North Amer. Geology for 1909 with Subject Index, 66*
 Nicolesco, M. Description de la distribution géographique du pétrole en Roumanie, 871*
 Nicolle, E. Rapport sur la question du Méridien de Greenwich comme base des fuseaux horaires, spécialement . . . au point de vue de la France, 73*
 Nielsen, J. N. Sur les températures des grandes profondeurs particulièrement dans la Méditerranée, 794*
 Nielsen, M. I. N. Carte montrant la distribution de la température . . . à l'époque du frai des principales *Gadides* (North Atlantic), 960*
 Nieve Penitente. See also Snow: Allerlei Beobachtungen über Schnee und Zackenfirn (Büsserschnee). F. Jaever, 479*; Penitentesschneefelder Gebiet zwischen Aconcagua und Tupungato. Dr. F. Reichert, 475*
 Niger R.: ¶ Navigation on the Upper.

- A. Chevalier, 288; Relief de la Boucle du-Niger. H. Hubert, 716*; Map: Schéma des Sources du Niger et du pays Toma, 955*
- Nigeria: ¶Afrique Occidentale Française et Nigeria Anglaise. B. de l'Escale, 68*; Nigerian Studies; or, The Religious and Political System of the Yoruba. R. E. Dennett, *rev.*, 460
- Northern Nigeria: ¶Map of Part of Nassarawa Province. D. Cator, 155*; Nigeria and Its Tin Fields. A. F. Calvert, *rev.*, 928; Origin of the Major Features of Geography of. J. D. Falconer, 396* ¶Maps of Northern Nigeria: Northern Nigeria: Divisions administratives, 877*; Part of Nassarawa Province. D. Cator, 78
- Southern Nigeria: ¶Annual Report, 1909, 951*; Blue Book for 1909, 69*; Land of Ekoi. P. A. Talbot, 155*; Memorial to Mungo Park and Richard Lander, 918; Mineral Survey of, 716*; Yola-Cross R. Boundary Comm. Maj. G. F. A. Whitlock, 396* ¶Map of Southern Nigeria: Oban District. P. A. Talbot, *n.*, 79
- Nikkosan, Japan, Key to the Guide Map of, 560*
- Nile: ¶Abflussgebiet des Nil. Dr. W. Pietsch, 637*; The Nile. Prof. W. Libbey, 637*; Valley of the. Capt. H. G. Lyons, 717*
- Nimrod, Voyage of the. Capt. J. K. Davis, 228*
- Nipe Bay Country — Cuba. I. A. Wright, 949*
- Nipigon Basin, Ontario, Geology of. A. W. G. Wilson, 554*
- Nipigon Lake, Thunder Bay District, Ontario, Map, 230*
- Nixon-Roulet, M. F. The Spaniard at Home, *rev.*, 383
- Noë, H. Brennerbuch. Naturansichten . . . Tirol, 238*; Neue Studien aus den Alpen, 238*; Österreichisches Seebuch, etc., 238*
- Noel, B. W. Notes of Tour in the Valleys of Piedmont . . . 1854, 238*
- Noetting, F. Antiquity of Man in Tasmania, 871*; Food of Tasmanian Aborigines, 871*
- Nolan, E. H. Illustrated History of British Empire in India, and the East from Earliest Times to Suppression. . . Sepoy Mutiny in 1859, 319*
- Nolen, J. Madison: A Model City, *rev.*, 625
- Noll, A. H. Life and Times of Miguel Hidalgo y Costilla, *rev.*, 374
- Nolloth, Port — (Südafrika), 396*
- Nordenskiöld, E. v. Exploration ethnogr. et archéol. en Bolivie, 475*; Siriono-Indianer in Ostbolivien, 395*
- Norfolk and Suffolk Coast. W. A. Dutt, *n.*, 382
- North America. See under America.
- North Carolina: ¶Exploration of Mounds in. C. Peabody, 394*; Forest Fires and their prevention, including Forest Fires in — during 1910. J. S. Holmes, 960*; Results of Spirit Levelling in . . . 1896-1909. R. B. Marshall, 313*; Summer Notes on Mountain Vegetation of Maywood Co. R. M. Harper, 66* ¶Maps of North Carolina: Abingdon Quad., 629*; S. Ellijay Quad., 389*; Distribution of Granites and Granite Quarries, 76*; Pamlico Sound, 875*; Map showing production of cotton in 1909, 229*; Charts U. S. Coast and Geod. Survey: Albemarle Sound from Pasquotank R. to Roanoke and Chowan Rivers, 309*; Atlantic Coast from Cape Henry to Cape Lookout, 309*; Oracoce Inlet to Beaufort, including Core Sound, 76*; Pasquotank R., 309*
- North Dakota: ¶Natural Gas in. A. G. Leonard, 474*; Washburn and Fort Berthold Lignite Fields. C. D. Smith, 222* ¶Maps of North Dakota: Map showing location of Gas Wells, 630*; Sketch Map of Missouri Coteau and its Moraines. J. E. Todd, 955*
- Northeast Passage: ¶Über die Fahrten der Novgoroder durchs karische Meer und . . . Halbinsel Jalmal zum Ob. A. Sibiriakoff, 70*
- North Island, N. Z. Map showing Land Transactions 1909-10, 232*
- North Pole: See Pole, North.
- North Sea: ¶Oberflächentemperatur beobachtungen in der Nordsee. Dr. E. van Everdingen, 228*
- Norway: ¶New Climbs in —. Account of Some Ascents in Sondmore District. E. C. Oppenheim, 238*; Ricerche oceanografiche Norvegesi. G. Platania, 317*; The Saga of King Sverri of. Translated by J. Sephton, 239*; Variations périodiques des glaciers, 1909. Norvège. P. A. Øven, 559* ¶Maps of Norway: Generalkart over det sydlige Norge i 18 Blade, 80*; Topografisk kart over kongeriget Norge, 80*
- Notizblatt des Vereins für Erdkunde und der Grossh. Geol. Landesanstalt zu Darmstadt für 1909, 227*
- Nova Scotia: ¶Arisaig-Antigonish District. M. Y. Williams, 949*; Gold-bearing Series of Lahave Basin. E. R.

- Faribault, 949*; Report of Dep. of Mines, 1910, 635* **¶** Map of Nova Scotia: Prince Edward Island, Nova Scotia and New Brunswick. R. E. Young, 78*
- Novaya Ziemla: Découverte de gisements de glace fossile à la Nouvelle-Zemble et au Spitsberg. C. Rabot, 479*; *Kolonisty Novoi Ziemli* (Colonists in 1910). N. Pietukhof, 719*; Northern Island of. New Station. [In Russian.] N. Pietukhof, 793*; Novoziemelskaya Zima [Winter of 1909-10]. I. Anufrief, 639*; Novaya Ziemla. T. Sokratova [Account of latest Explorations], 479*; Russian Expedition to, 291; Winds and Ice in the White Sea and Novaya Ziemla in 1910. I. Anufrief, 559*
- Novicov, J. de. Expansion de la langue française dans le monde, 479*
- Nubia, Egypt, — and Ethiopia. J. Bonomi *et al.*, 319*; Karanög. The Romano-Nubian Cemetery. C. L. Woolley and D. Randall-MacIver, *n.*, 388
- Nueva Leon, Historia de, — con Noticias sobre Coahuila, Tejas y Nuevo Mexico. Cap. Alonso de Leon *et al.*, Documentos inéditos . . . pub. por G. García, 480*
- Nugent, Sir Walter Richard. Irlande industrielle, 227*
- Nulato—Council Region, Alaska, Mineral Resources of. P. S. Smith and H. M. Eakin, 151*
- Nulato—Norton Bay Region, Alaska, Geol. Map of, *n.*, 630
- Nuttall, Z. Island of Sacrificios, 222*
- Nutting, C. C. Hydroids (Harriman Alaska Series), 480*
- Nyasaland: **¶** Agricultural Labour Conditions in. J. C. Casson, 556* **¶** Map: Carte géol. du Nyassaland. A. R. P. Andrew et T. E. G. Bailey, 708*
- O.
- Oak, Book of the English —. C. Hurst, *n.*, 944
- Oberhummer, Prof. E. Œuvre géographique d'Alexandre de Humboldt au Mexique, 636*; Terraindarstellung auf Stadtplanen, 74*
- Obi and Yenisei, Gulfs of. Chart Compiled 1910 from surveys 1828-1909, 799*
- Obituary:
 Ameghino, Dr. Don, Florentino, 921
 Calvin, Prof. Samuel, 624
 Emmons, Dr. Samuel Franklin, 294
 Götz, Prof. Wilhelm, 529
 Götzen, Count Adolph von, 59
 Howell, Edwin E., 624
 Levasseur, Pierre Émile, 862
 Robb, J. Hampden, 294
 Schenk, Dr. Alexandre, 204
 Strauch, General, 861
 Whymper, Edward, 861
- Oceania: **¶** Statistiques du Commerce, 1908. Établissements français de l'Océanie, 792*
- Oceanography: **¶** Bulletin Hydrographique pour 1908-1909, 74*; Campagne scientifique de la Princesse Alice. Liste des Stations. J. Richard, 399*; Sur la dixième campagne de la *Princesse-Alice II*, 399*; Sur la douzième Campagne de la —. Prince Albert I, de Monaco, 872*; Conseil Permanent Intern. pour l'Exploration de la Mer. Rapports et Procès-Verbaux des Réunions, 1909-10, 640*; Contributions au Système des Méduses, basées sur des Formes bathypélagiques des Campagnes Scientifiques de Prince de Monaco. Dr. O. Maas, 317*; Couleurs des Fonds marins. J. Thoulet, 318*; Die dänische ozeanographische Expedition nach dem Mittelmeere, 1908-9. N. Mey, 228*; The Deep Sea. Sir John Murray, 119; Elementare Theorie der Gezeiten; nebst den Gezeitenkonstanten der wichtigsten Orte des Indischen Archipels und anderer Hafenplätze. J. P. van der Stok, 953*; Forschungsreise S. M. S. Planet, 1906-7. 111 Band: Ozeanographie. Dr. W. Brennecke. Dr. Gräf, und Dr. A. Krämer, *n.*, 212; Hydrographische Beobachtungen der schwedischen Expedition nach Spitzbergen 1908. A. C. Reichard, 872*; Mesure des densités d'Eaux marines par flotteurs totalement immergés. J. Thoulet et Chevalier, 318*; Method of Mapping the Distribution of Marine Algae. N. M. Johnson, 399*; Neuere ozeanographische Arbeiten der Deutschen Marine . . . Seewarte. Dr. G. Schott, 74*; Origin and Peopling of the Deep Sea. Prof. J. Walther, 318*; Origin of the Permanent Ocean Highs. J. W. Humphreys, 953*; Ozeanographische Arbeiten der Deutschen Antarktischen Expedition. Dr. W. Brennecke, 952*; Physische Meereskunde. Dr. G. Schott, *n.*, 387; Principaux résultats d'océanographie physique (Expédition Antarctique du Dr. Charcot). J. Rouch, 872*; Über die ozeanographischen Ergebnisse der Ausreise . . . Planet. L. Mecking, 317*; Résumé des Ob-

- servations sur le Plankton des Mers explorées par le Conseil pendant . . . 1902-8, 318*; Recherche oceanographique Norvegesi. G. Platania, 317*; Températures de l'Atlantique Nord (Surface et Profondeurs). A. Hauteux, 640*; Sur les températures des grandes profondeurs particulièrement dans la Méditerranée. J. N. Nielsen, 794*; Tiefsee-Forschungen der "Planet" — Expedition, 1906-07. Dr. W. Brennecke, 72*; Tiefseelutungen S. M. S. Planet, 1910, 399*; Unterseeische Gebirge. Dr. M. Groll, 640*. ¶ Maps: Carte générale bathymétrique des Océans. H. Bourée, 73*; Maps showing distribution of pelagic fry and the spawning regions of gadoids in North Atlantic Ocean, 960*
- Odenwald, Maps: Karte zur Siedlungsgeographie des Odenwaldes, 798*; Übersichtskarte der Siedlungsverteilung im, 798*
- Oestreich, K. Oberfläche Mazedoniens, 227*
- Ögel Lake, Formation of an Island on. Prof. Potonié, 623
- Ogilby, J. Africa: Being an Accurate Description of the regions of Aegypt, Barbary, Lybia, and Billedulgerid . . . Abyssines, etc. Collected and Translated from most Authentick Authors (1670), etc., by —, 319*
- Ogowé, Reconnaissances sur l'. J. Dubrouillet, 555*
- O'Harra, C. C. Badlands of the Black Hills, S. D., 52; Map of Black Hills Region, S. D., *n.*, 77
- Ohio: ¶ Abandoned Shore Lines of the Oberlin Quadrangle. F. Carney, 394*; Geographic Influences in the Development of. F. Carney, 867*; Mineral Resources of. J. A. Bownocker, 714*; Raised Beaches of Berea, Cleveland and Euclid Sheets. F. Carney, 394*. ¶ Maps of Ohio: Antrim Quad., 544*; Conesville, Frazeyburg, Granville, McConnelville and Philo Quadrangles, 75*; Covington, Delphos, and Uhrichsville Quadrangles, 873*; New Lexington Quad., 389*; Sketch Map of Parts of Ohio, etc., showing oil and gas fields, location of Quadrangles and nature of geol. reports published on each, 874*
- Ohio River, From the Hudson to the. W. B. Wilson, 720*
- Ohnefalsch-Richter, Dr. M. Entdeckung des bei Homer erwähnten Räucheraltarpfades der Aphrodite in Paphos auf Cypern, 317*
- Okakura-Kakuzo. Awakening of Japan, 400*
- Oklahoma: ¶ Analyses of Crude Petroleum from Oklahoma and Kansas. D. T. Day, 151*; Director's Biennial Report, 1910, 715*; Madill Oil Pool. J. A. Taff and W. J. Reed, 151*; Oklahoma Geol. Survey, 521; Report on geological and Mineral Resources of Arbuckle Mts. C. A. Reeds, 880*. ¶ Maps of Oklahoma: McComb Quadrangle, 308*; Pawhuska Quad., 75*; Map showing production of cotton in 1909, 229*; Progress Geological Map of. C. N. Gould, 796*
- Olbricht, K. Diluvium in der Umgebung von Hanover, 315*; Höhenschichtenkarte der Lüneburger Heide, 226*; Städte des rheinisch-westfälischen Industriebezirks, 398*
- Oldys, H., *joint author*, see T. S. Palmer.
- Olivares, J. de (*et al.*). Our Islands and their People, as seen with Camera, etc., 319*
- Oliveira Lima, de. Limites actuelles du Brésil par suite des derniers arbitrages et traités, 868*
- Oliver, M. L. The Snake Dance, 714*
- Olsson-Seffer, Helen. Isthmus of Tehuantepec, 152*
- Olsson-Seffer, P. Genesis and Development of Sand Formations on Marine Coasts, 953*
- Olympia, Burial of. E. Huntington, 398*; Die Funde von Olympia. (R. Borrmann), 237*
- Oman: ¶ On Border of the Great Desert: Journey in Oman. Lieut. Col. S. B. Miles, 70*; Notes on. Rev. S. M. Zwemer, 396*
- Omori, F. Usu-San Eruption and Earthquake and Elevation Phenomena, 951*
- Onondaga Sea, Southerly Extension of — in the Allegheny Region. E. M. Kindle, 714*
- Ontario: ¶ Conservation of Natural Resources of. Hon. F. Cochrane, 475*; Conservation of Water-Powers of. Hon. Adam Beck, 475*; Devonian of Southwestern Ontario. C. R. Stauffer, 949*; Geology of Haliburton and Bancroft Areas. F. D. Adams and A. E. Barlow, 66*; Geology of Nipigon Basin. A. W. G. Wilson, 554*; Instrumental Survey of Shorelines of Extinct Lakes Algonquin and Nipissing in S. W. — J. W. Goldthwait, 949*; Prairie Province: Sketches of Travel from Lake Ontario to Lake Winnipeg. J. C. Hamilton, 400*; Settlement of Northern —. T.

- Southworth, 66*; Simcoe District. W. A. Johnston, 949* ¶ Maps of Ontario: Algoma, Sudbury and Nipissing Districts, 546*; Diagrams Showing Present Attitude of Algonquin, and of Nipissing Water Plane, 633*; Cowganda sheet. R. E. Young, 77*; Outline Map of part of southern —, 633*
 Ontography: Organic Response. Dr. D. T. Macdougall, 399*
 Opium: Question de l'opium. Un nouvel accord anglo-chinois, 951*
 Oporto: Relatório da Direcção no Anno de 1910, 478*
 Oppel, Dr. A. Seestädte der Erde nach ihren Leistungen im Schiffsverkehr und im Wertumsatz, 479*
 Oppenheim, E. C. New Climbs in Norway. Account of Some Ascents in Søndmore District, 238*
 Oppenheim, Dr. M. Fr. v. Zweite Reise in der Asiatischen Türkei 1899 von — (Maps), 798*
 Oracoke Inlet, N. C., to Beaufort, including Core Sound, Chart U. S. Coast and Geod. Surv., 76*
 Orange and Vaal Rivers, Map: Kärtchen der Eisbewegung zur Dwyka-Eiszeit am Oranje und Vaal, 708*
 Oranges, Low Temperatures Injurious to, 367
 Ore Deposits, Map: Weltkarte der Erzlagerstätten. J. W. H. Adam, n., 80
 Oregon: ¶ Gas and Oil Prospects near Vale, etc. C. W. Washburne, 474*; Gas Prospects in Harney Valley. C. W. Washburne, 474*, 714*; Oregon, Washington, Idaho, etc. Miners' and Travelers' Guide to. J. Mullan, 400*; Prel. Report on the Coos Bay Coal Field. J. S. Diller and M. A. Pishel, 867*; Results of Spirit Leveling in —, 1896 to 1910. R. B. Marshall, 867* ¶ Maps of Oregon: Crater Lake National Park, 874*; Eugene Quad., 75*; Index Map to Atlas Sheets, n., 631; Map of Middle Part of Coos Bay Coal Field. J. S. Diller and M. A. Pishel, 630*; Maps of Coos Bay Coal Field and of Township. J. S. Diller and M. A. Pishel, 630*; Northern Part of Coos Bay Coal Field. J. S. Diller and M. A. Pishel, 630*; Reconnaissance Sketch Map of Prospective Gas and Oil Fields near Vale, n., 630; Chart U. S. Coast and Geod. Survey: Pacific Coast. Cape Lookout to Gray's Harbor, 76*
 Organic Response. Dr. D. T. Macdougall, 399*
 Orléans, Prince Henri d' —. From Tonkin to India by the Sources of Iravadi, 237*
 Ortúzar, A. Chile of To-Day, Its Commerce, Production, etc., 319*
 Osborn, H. F. Age of Mammals in Europe, Asia and North America, *rev.*, 541
 Ossenbruggen, F. D. E. van. Eigenaardige Gebruiken Bij Pokken-Epidemieën in den Indischen Archipel, 557*
 Ostrich Industry, Application of Science to. Prof. J. E. Duerden, 396*
 Otahiti. See Tahiti.
 Otero de Herreros, Segovia, Ensayo de los Métodos fotogramétricos, en el Término municipal de —. J. Galbiss y Rodríguez, 960*
 Ottawa R. Basin: Water Wealth of Canada with Special Reference to —. C. R. Coutlee, 475* ¶ Map of the Ottawa River Basin, 230*
 Oustry, M. Notes sur le Haut Ziz, 476*
 Overbergh, Cyr. van, et Ed. de Jonghe. Les Bangala, *rev.*, 303
 Owen, L. A. Missouri R. and Its Future Importance to the Nations of Europe, 948*
 Owens, Dr. J. S. Experiments on Settlement of Solids in Water, 317*
 Oxley, T. L. Jacques Balmat, or, The First Ascent of Mont Blanc, 239*
 Oxrhynchus Papyri. Part VIII. Edited with translations and notes by A. S. Hunt, 880*
 Øyen, P. A. Variations périodiques des glaciers 1909. Norvège, 559*
 Oysters: Ostréiculture, 872*
 Ozark Regions, Soils of. Prof. C. F. Marbut, 366
- P.
- Pacific Coast, Charts U. S. Coast and Geodetic Survey, 76*, 875*
 Pacific Ocean: ¶ Forschungsreise S. M. S. Planet, 1906-7. Dr. W. Brennecke, Dr. Gräf, und Dr. A. Krämer, n., 212; Seismische Verhalten des Atlantischen und Pazifischen Ozeans. Dr. G. Gerland, 73*; Temperatur- und Salzgehaltsbestimmungen aus den Oberflächen- und Tiefenschichten des südwestlichen Stillen Ozeans, 318*; Tiefsee-Forschungen der "Planet"— Expedition. Dr. W. Brennecke, 72*; Verlauf der Deutschen Marine-Expedition 1907-9. Dr. A. Krämer-Bannow, 226*
 ¶ Maps of the Pacific Ocean: Approximate Tracks of Typhoons and Depressions, Sept., 1910, 473*; Routes of

- Galleons in the Pacific as Noted in their Log Books, 799*; Charts of the U. S. Hydrographic Office: Pilot Charts of the North Pacific, 158, 229, 309, 389, 470*; Pilot Charts of the South Pacific, 158, 229, 470*; U. S. Weather Bureau Charts: Meteorological Charts of the North Pacific Ocean, 158, 229, 309, 389, 632*; Meteorological Charts of the South Pacific, 158, 389*
- Pacific Ocean, Islands of the. See also South Sea Islands: Eastern Pacific Lands: Tahiti and the Marquesas Islands. F. W. Christian, *rev.*, 380; Fur Seals and Fur-Seal Islands of the North Pacific. D. S. Jordan *et al.*, 239*; Voyage of the S. Y. "Nimrod." Capt. J. K. Davis, 228*
- Paige, S. Mineral Resources of Llano-Burnet Region, Texas, with an Account of Pre-Cambrian Geology, 948*
- Palache, C., *joint author*, see B. K. Emerson.
- Palafox y Mendoza, Don Juan de. Su virreinato en la Nueva España, etc. Documentos inéditos . . . por G. García, 480*
- Palencia, R. Wine Growing Industry in Argentina, 314*
- Paleozoic Land Connections, Map of Part of Northern Hemisphere showing — and paths of marine faunal migrations, 959*
- Palestine: ¶ Aufnahme des Ostjordanlandes durch den Deutsche Palästina-Verein. Prof. Dr. Guthe, 397*; Climate of Palestine. Dr. F. M. Exner, 368; Palestine and its Transformation. E. Huntington, *rev.*, 461; Sites délaissés d'Orient: du Sinaï à Jérusalem. Comte J. de Kergorlay, 225* ¶ Map of Palestine: Karte des Ostjordanlandes. Dr. G. Schumacher, 709*
- Palmer, H. Part of Selkirk Range adjacent to Mount Sir Sandford, (Map), 230*
- Palmer Land. E. S. Balch, 282
- Palmer, T. S., and H. Oldys. Progress of Game Protection in 1910, 948*
- Paltsits, V. H., *editor*. Minutes of Executive, Council of the Province of New York. Administration of Francis Lovelace, 1668-1673 . . . from original MS. in the British Museum, Vol. I, 319*; II, 560*
- Pamlico Sound, N. C., Chart U. S. Coast and Geod. Surv., 875*
- Pampas, Gran-Chako und die. W. Simon, 67*
- Panama: ¶ Up Country in. F. Lindsay, 314*; Geografía del Istmo de Panamá. R. M. Valdés, 640*; Prof. Pittier's Investigations in, 524; Republic of — its People with Special Reference to the Indians. E. Y. Bell, 314*
- Panama Canal: ¶ Atlantic Terminal Docks on the, 620; Canal and Its Makers. V. Cornish, *rev.*, 62; Panama Canal, 134; Panama Canal. Dr. V. Cornish, 395*; — Col. G. W. Goethals, 790*; Work on the, 854 ¶ Map of Panama Canal: Contour Map and Profile of the Canal, *n.*, 230
- Panama Canal Zone: ¶ Biological Survey of Panama Canal Zone, 53; Canal Zone Triangulation System, 365; Panama Canal Zone Land Survey, 854 ¶ Maps of Panama Canal Zone: Canal Zone. Location and Auxiliary Structures of the Canal, *n.*, 310; Colon Harbor. Chart U. S. Coast and Geod. Surv., 631*; Panama Road; Colon Harbor, 158*; Map showing Canal Zone and watershed of Rio Chagres, 230*; Map of Canal Zone, 230*
- Panay, Charts U. S. Coast and Geod. Surv., 875*
- Paparrigopoulo, M. C. Histoire de la Civilisation hellénique, 400*
- Paphos auf Cypern, Entdeckung des bei Homer erwähnten Räucheraltplatzes der Aphrodite in. Dr. M. Ohnefalsch-Richter, 317*
- Papua. (British New-Guinea): ¶ Anthropological Expedition to New Guinea, 688; Chez les indigènes de la Nouvelle-Guinée Britannique. Marquis de Cacqueray, 225*; The New New Guinea. A. Grimshaw, *rev.*, 381; Papua and the Papuans. Hon. J. G. Jenkins, 558* ¶ Map of Papua: Map of Territory of, Latest Surveys, 957*
- Paraguay: ¶ Aperçu de la géographie botanique du. Dr. R. Chodat and Dr. E. Hassler, 67*; Beiträge zur Kenntnis des Quebrachogebietes in Argentinien und Paraguay. Dr. R. Lütgens, 715*; Cuestión de Límites entre el Paraguay y Bolivia. A. Audibert, 720*; Reisen in Matto Grosso und —. C. Carnier, 869*; Unknown People in an Unknown Land. Account of the Life and Customs of Lengua Indians of the Paraguayan Chaco, with Adventures . . . amongst them. W. B. Grubb, *rev.*, 458
- Para Rubber. See also Rubber: Die *Hevea Brasiliensis*, 872*
- Pardee, J. T. Geol. Map of Upper St. Joe R. Basin, Idaho, 874*
- Paris: ¶ Inondations à Paris du V^e au XX^e siècle. E. Clouzot, 638*; Paris, port de mer. G. Blondel, 952*;

- Les Ports de. A. Pawlowski, *n.*, 383;
Travels from Berlin, through Switzerland to — in 1804. A. v. Kotzebue, 238*
- Paris, T. C. Letters from the Pyrenees during . . . 1842, 239*
- Park, Mungo, and Richard Lander, Memorial to, 918
- Park, Prof. J. Great Ice Age of New Zealand, 70*; Tarawera Eruption and After, 638*
- Parker, A. C. Iroquois Uses of Maize and other Food Plants, 714*, 394*
- Parker, N. H. Kansas and Nebraska Handbook for 1857-8, 236*
- Parkins, A. E. Comparison of Trans-Appalachian Railroads, 314*; Railroad Distances in New York, 26; Valley Filling by Intermittent Streams, 719*
- Paschinger, Dr. V. Schneegrenze in den französischen Alpen, 793*
- Pasi, P. Colonia del Capo, 950*
- Pasquotank R., Chart U. S. Coast and Geod. Surv., 309*
- Passaic R., Chart U. S. Coast and Geod. Surv., 76*
- Passarge, Dr. S. Geomorphologische Probleme aus Kamerun, 153*; Kalkpfannen des östlichen Damaralandes, 154*
- Passerat, Ch. Origines de la vallée de la Charente, 871*
- Pastures: Surcharge des pâturage et l'aménagement des montagnes. P. Descombes, 72*
- Patagonia: ¶ Bismarck-Gletscher, ein vorrückender Gletscher in der patagonischen Cordillere. Dr. R. Hauthal, 476*; Einige Beobachtungen über die Eingeborenen Westpatagoniens. C. Skottsberg, 153*; Patagonischen Anden zwischen 42. und 44. Grade s. Breite. Dr. P. Krüger, 949*; Wirtschaftliche Erschliessung Patagoniens. G. L. F. Córdoba, 869*; Map of Patagonia: Andine Gebiet Patagoniens zwischen 40° und 44° S. Prof. P. Krüger, *n.*, 634
- Pawlowski, A. L'île d'Yeu à travers les âges, d'après la géologie, la cartographie et l'histoire, 718*; Les Ports de Paris, *n.*, 383
- Peabody, C. Exploration of Mounds in North Carolina, 394*
- Pearl River Drainage Basin, 394*
- Pearson, H. H. W. On the Collection of Dried Plants obtained in South-West Africa by Percy Sladen Memorial Expedition, 1908-11, 717*
- Peary, Adm. R. E. The North Pole, Its Discovery in 1909, *rev.*, 214; Personal, 528; Peary Arctic Club Expedition to the North Pole, 1908-9, 72*
- Peddle, H. J. Development of Inland Waterways of the United Kingdom, 72
- Pedee, R. See Yadkin R.
- Pelliot, P. Trois ans de mission dans la Haute-Asie, 557*
- Pelvoux, Le Col du. H. Mettrier, 71*
- Penck, A. Erforschung des Kaiserin Augusta Flusses, 952*
- Pennsylvania: ¶ High Terraces and Abandoned Valleys in Western. E. W. Shaw, 714*; Mineral Resources of Johnston and Vicinity. W. C. Phalen and L. Martin, 553* ¶ Maps of Pennsylvania: Bedford, New Kensington, York and Zelenople Quadrangles, 75*; Butler Quad., 389*; Hamburg Quad., 874*; Economic and Structural Map of Johnstown Quad., *n.*, 389; Geol. Map of Foxburg Quad. showing Structure and Coal Outcrops. E. W. Shaw, 874*; Map showing original extent of Vanport limestone members in Foxburg quad., 874*; Reconnaissance Map of Oil and Gas Pools of Foxburg Quad., showing structure and producing Areas of various Oil Sands, 874*; Sketch Map of western — etc., showing oil and gas fields, location of quadrangles and nature of geol. reports printed on each, 874*; Sketch Map showing Thickness, Extent and Structure of the Third or Gordon Sand in Foxburg Quad., 874*; Soil Map of S. W. Pennsylvania, *n.*, 389; Taneytown Quad., 629*; Top. and Geol. Survey of, 1906-8, 880*
- Penobscot Bay and E. —, Charts U. S. Coast and Geod. Surv., 157*, 875*
- Pepperberg, L. J. Milk R. Coal Field, Montana, 221*
- Peppler, A. Fortschritte in der Erforschung der freien Atmosphäre während letzten Dezenniums, 953*
- Peralta, F. Contribution à l'étude de l'acclimatement du Bétail européen au Costa Rica, 554*
- Périgueux, Un syndicat de Navigation à — pour la Rivière de l'Isle en 1520. F. Villepelet, 719*
- Pernambuco: ¶ Diccionario chorographico, historico e estatístico de Pernambuco. S. de Galvão Vasconcellos, 223*
- Perron, C. Réfection en Fac-similé des anciens monuments de Géographie et son utilité . . . Musées cartographiques, 73*
- Perry, Commodore M. C. Sailing Directions and Nautical Remarks: by

- Officers of U. S. Naval Expedition to Japan under the command of —, 237*
- Persia: ¶Geographische Charakterbilder aus . . . und südlichen mesopotirischen Randgebirge (Pusch-i-küh). Dr. H. Grothe, *n.*, 65; The Glory of the Shia World. Tale of a Pilgrimage. Edit. and Transl. from Persian MM. by Maj. P. M. Sykes, *rev.*, 784; Aus dem Märchenlande von 1001 Nacht. Beobachtungen . . . eines Geologen in nördlichen Persien. Band I. H. Pöhl, *n.*, 931; Meine Expedition durch Vorder-Asien (Klein-Asien, Mesopotamien, Persien). Dr. H. Grothe, 870*; Persia and Its People. E. C. Sykes, *n.*, 544; Persia in Revolution. With Notes of Travel in Caucasus. J. M. Hone and P. L. Dickinson, *rev.*, 462; The proposed Trans-Persian Railway. Lieut.-Col. A. C. Yate, 717* ¶Maps of Persia: Map of Eastern Turkey in Asia, Syria and Western Persia, *n.*, 160; North-East Persia, 160*; Strauss' Reiserouten im westlichen Persien, 310*
- Peru: ¶Arbitraje entre las repúblicas de Bolivia y el — y su última negociación sobre fronteras, *n.*, 302; Ein Bergfahrt im nördlichen —. Dr. O. Schlagintweit, 715*; La ciencia y los temblores. R. G. Rosell, 715*; Informe que la Comisión del Observatorio sismográfico presenta a la Sociedad geogr. de Lima, 715*; Climate and Man in Peru. Dr. L. L. W. Wilson, 67*; Distrito de Lunahuaná Provincia de Cañete. Fr. F. C. Salinas, 715*; Itinerario de los viajes de Raimondini en el Perú, 715*; Land of the Incas. Sir Clements R. Markham, 153*; Navegación nel el Perú. R. Melo, 715*; Note on Map of S. Peru and N. Bolivia. E. A. Reeves, 395*; Peru To-Day. Geographical Sketch. C. W. Sutton, 636*; A propos du Pérou. F. Clément-Simon, 153*; Remarks on Arbitral Sentence . . . Boundary Question between Bolivia and Peru. P. Fiore, 800*; Some Results of Recent Anthropological Exploration in. Dr. A. Hrdlička, 619; Ruins of Choquequirau. H. Bingham, 476*; Temblores en el Perú en 1906, 790*; Yale Expedition to. Prof. H. Bingham, 287; Yale Expedition of 1911, 685 ¶Economic: Cotton Industry. W. S. Lorrie, 153*; Cotton Production of. J. A. Lavalle y García, 715*; Estadística Minera en 1908. C. P. Jiménez, 67*; Guano Industry, 636*; Industrial and Productive Life of, 685; Irrigation of the Coast of. C. W. Sutton, 715*; Petroleum Industry. F. E. Ross, 555*; Production of Rubber in. C. Romero and F. E. Ross, 636*; Sugar Industry, 395* ¶Historia de las Guerras Civiles del Perú (1544-1548). y de Otros Sucesos de las Indias. P. Gutiérrez de Santa Clara, *n.*, 946 ¶Maps of Peru: ¶Departamento de Cajamarca. F. Malaga Santolalla y C. Vallejos, 547*; — de Loreto corregido y aumentado con los estudios de los Srs. Espinar, Buenaño, y otros, *n.*, 547; Mapa que comprende las últimas exploraciones y estudios verificados, 78*
- Pervinquier, L. Le Sud Tunisien, 314*
- Petermann, August: Ein Beitrag zur Geschichte der geographischen Entdeckungen und der Kartographie im 19. Jahrhundert. Dr. E. Weller, *rev.*, 845
- Petermanns Mitteilungen, Globus merged with, 138
- Peters, Dr. C. Archæological Discoveries in South Africa, 55
- Peters, W. J., joint author, see Dr. L. A. Bauer.
- Petersen, J. Unperiodische Temperaturschwankungen im Golfstrom und deren Beziehung zu der Luftdruckverteilung, 317*
- Petitot, E. Dates importantes pour l'histoire de la découverte géographique du Canada, 554*
- Petrie, W. M. F. Arts and Crafts of Ancient Egypt, *rev.*, 206
- Petroleum: ¶Exploitation du Pétrole. Historique-Extraction-Géographie et Géologie, etc. L. C. Tassart, *rev.*, 147; The Story of Oil. W. S. Tower, *rev.*, 146
- Petterd, W. F. Minerals of Tasmania, 871*
- Peucker, Dr. K. Höhengschichtenkarten. Studien und Kritiken zur Lösung des Flugkartenproblems, *rev.*, 465
- Pfälzerwald. D. Häberle, 952*
- Pfaundler, Dr. R. Verbreitungsgebiet der deutschen Sprache im Südungarn, (Map), 878*
- Phalen, W. C., and L. Martin. Mineral Resources of Johnston, Pa. and Vicinity, 553*
- Philadelphia, Growth and Extent of Textile Industries of. J. J. Macfarlane, 789* ¶Map: Philadelphia Water Front, Schuylkill R., Chart U.S. Coast and Geod. Surv., 631*
- Philadelphia Commercial Museum, Its Bureau of Foreign Trade, 789*
- Philippine Islands: ¶Essential Fea-

- tures of Geology of —. W. D. Smith, 557*; États-Unis et les —. H. Marchand, 948*; The Discoverer of the Philippines. J. D. Champlin, 587; *Erratum*, 862; *Iti Dalan Ti Santa Nga Krux* [Ilokono Dialect]. (The way of the Holy Cross). F. C. Meredith, *Editor*, 880*; Philippine Islands. R. R. Lala, 400*; Philippine Types. R. B. Bean, 397*; Negrito and Allied Types in. D. P. Barrows, 397*; Types of Negritos. R. B. Bean, 477*; Progress and Problems in the. Rev. C. H. Brent, 477*; Racial Anatomy of Islanders. R. B. Bean, *rev.*, 783; Reports of Philippine Commission, 1910, 870*; of Secretary of the Interior, 1910, 870*; of Secretary of Public Instruction, 1910, 870*; Seismic Centers of Samar, Leyte, and E. Mindanao. Rev. M. Saderra Masó, 557*; Eruption of Taal Volcano. Abridged from paper, by W. E. Pratt, 903; Visit to the. G. Vassal, 397* ¶ Climatic: Annual Report of Director of the Weather Bureau, for 1908, 870*; Meteor. Observations . . . 1906, *Annual Report Weather Bureau*, 638*; New Meteorological Observatory, 137 ¶ Economic: Bureau of Customs, Report Philippine Comm., 1910, 870*; Conservation policy for the. Dr. D. P. Barrows, 477*; Economic Possibilities of Mangrove Swamps. R. R. Williams, 951*; Gold Deposits of. H. G. Ferguson, 638*; Growth of Manila Hemp Industry, 527; Mineral Resources with Statement . . . Commercial Mineral Products for 1909, 315*; Natural Dyes and Coloring Matters of the. B. T. Brooks, 718*; Philippine Firewood. A. J. Cox, 951*; Report of Secretary of Commerce and Police, 1910, 870* ¶ Maps of Philippine Islands: Geologic Map of — Islands, *n.*, 472; Principal Mineral Districts and Distribution of Known Coal Fields, 472*; Map showing Relation of Recent Vulcanism to Principal Tectonic Lines, *n.*, 472; Sketch Map of the Taal Volcano Region, 957*; Sulu Island, 472*; Charts U. S. Coast and Geod. Survey: Albay Gulf and Part of Lagonoy Gulf, E. Coast of Luzon, 545*; Anchorage, Verde Island Passage to Cuyo, 631*; Cebu Harbor, S. W. Luzon and Mindoro, Passage between Luzon and Masbate, Manila Bay, S. Part Samar, W. Bohol, 158*; Guian Harbor, South Coast of Samar, 875*; Harbors in Negros and Vicinity, 9 Charts, 632*; Inland Waters South of Luzon, Ragay Gulf to Tayabas Bay, 309*; Mangarin and Pandarochan Bays, 875*; Mindoro, North Coast, Port Gallera and Varadero Bay, 76*; Negros and Cebu. Northern part of Tañon Strait, 309*; Panay, Negros and Cebu with parts of Bohol and Masbate, 309*; N. E. Panay and Adjacent Islands, 875*; Samar and Leyte. Calbayog to Tacloban, 309*; Philippine Islands, *n.*, 76, Sketch map of Gen. Progress, Rep. 1909-10, 470*; West Coast of S. W. Luzon, 158, Manila Bay to Candon Point, 309*; Sulu Archipelago, 545* Philippson, A. Geol. Karte des westlichen Kleinasien, 708*; Reisen und Forschungen in westlichen Kleinasien. Das westliche Mysien und die pergamenische Landschaft, 951*; map, *n.* 548 Phosphates: Our greatest Plant Food. G. E. Mitchell, 317* Physical Geography. See under Geography. Physiography: ¶ Elementary —. R. D. Salisbury, *rev.*, 386; Physiographical Introduction to Geography. A. J. Herbertson, *n.*, 219; Physiography in the High School. R. D. Salisbury, 399* Piedmont, Narrative of Excursion to the Mountains of — and Researches among the Vaudois, etc. W. S. Gilly, 238*; Notes of a Tour in the Valleys of — . . . 1854. B. W. Noel, 238* Pierce, F. A. Sponge Industry of the Americas, 553* Pierson, A. H. Consumption of Firewood in U. S., 151* Pietsch, Dr. W. Abflussgebiet des Nil, 637* Pietschmann, Dr. V., Studie zu —'s photogrammetrischen Aufnahmen in Mesopotamien. I. Tschamler, *n.*, 960 Pietukhov, N. Colonists of Novaya Ziemla in 1910, 719*; Northern Island of Novaya Ziemla. New Station. [In Russian], 793* Pilcomayo, Rio. Carte de la région des marais du — et du Rio Confuso. A. Schmied et Arnold, 67* Pilgrim Fathers, History of the Puritans of England and the W. H. Stowell and D. Wilson, 239* Pillado, R. Meat Industry of Argentine Republic, 314* Pinchot, G. Fight for Conservation, *n.*, 388 Pirsson, L. V. Petrography of Tripyramid Mountain, 789* Piscicelli, Capt. M. Sul Lago Bangueolo, 68*

- Pishel, M. A., *joint author*, see J. S. Diller.
- Pittier, Prof. H. F., *Investigations in Panama*, 524
- Pittsburg District, Pa., *Map showing principal Areas of Gravel Deposits in*, 229*
- Place Determinations: *Theorie der astrographischen Ortsbestimmung*. Dr. L. de Ball, 72*
- Place Names, *Regional Peculiarities in*. R. H. Whitbeck, 273
- Place, T. A. J. *Cotton Cultivation: Prospects in Transvaal*, 555*
- Planet-Expedition, *Tiefsee-Forschungen der-* (1906-7). Dr. W. Brennecke, 72*; —. Dr. W. Brennecke, Dr. Gräf, und Dr. Krämer, *n.*, 212
- Plankton, *Résumé des Observations sur le — des Mers explorées par le Conseil* . . . 1902-8, 318*
- Plant-Animals. F. Keeble, *n.*, 947
- Plants: ¶ *Beiträge zur Kenntnis der Höhengrenzen der Vegetation im Mittelmeergebiet*. Dr. M. Koch, *n.*, 933; *On the Collection of Dried Plants obtained in S. W. Africa by Percy Sladen Memorial Exp.*, 1908-11. H. H. W. Pearson, 717*; *Zur Düngung der tropischen Kulturpflanzen*. Prof. Dr. Fesca, 317*; *Relation of Climate to Cranberry Growing*. H. J. Cox, 196; *Early Spring Aspects of Coastal Plain Vegetation of South Carolina, Georgia, and N. E. Florida*. R. M. Harper, 948*; *Einfluss der klimatischen Faktoren auf die Vegetation im allgemeinen und speziell auf die Höhe des Pflanzenertrages*. Dr. P. Vageler, 872*; *Introduction of economic plants into Queensland*. J. F. Bailey, 225; *Nouvelles recherches sur la distribution florale*. Dr. P. Jaccard, 74*; *Pflanzenbau in den Tropen und Subtropen*. Prof. Fesca, *n.*, 937; *Südpolar-Land in seinen Beziehungen zur Verbreitung der Pflanzen und Tierre*. M. Alsberg, 952*; *Zur Verbreitung einiger Nutzpflanzen*. Dr. F. Höck, 952*
- Plassmann, Prof. J. *Meteorbeobachtungen auf See*, 794*
- Plata, La. *Museum of*. Rev. C. W. Currier, 636*
- Platania, G. *Ricerche oceanografiche Norvegesi*, 317*; *Stromboli*, 71*
- Playfair, Maj. A. *The Garos*, *rev.*, 65
- Pleistocene Glaciation: See under Glaciers.
- Plenty River and Anderson Creek, Warrandyte, Victoria, *Contribution to Physical History of*. J. T. Jutson, 226*
- Plum Island to Stratford Shoal, *Chart U. S. Coast and Geod. Surv.*, 158*
- Plymouth, Kingston and Duxbury Harbors, Mass., *Chart U. S. Coast and Geod. Surv.*, 875*
- Pöch, Dr. R. *Erdkarte des Ausbreitung der Pest am Ende des 19 u. Anfang des 20. Jahrh.*, *n.*, 473; *Meine Beide Kalahari Reisen 1908-09*, 396*; *Postkarte der Mandchurei*, 472*
- Pohlig, H. *Aus dem Märchenlande von 1001 Nacht. Beobachtungen... eines Geologen in nördlichen Persien*, *rev.*, 931
- Point au Fer to Marsh Island, La., *Chart U. S. Coast and Geod. Surv.*, 631*
- Polakowsky, Dr. H. *Von der chilenischen Längsbahn*, 153*
- Polar Regions. See also Arctic and Antarctic: ¶ *Über den Begriff Inlandeis, nebst Bemerkung über die Schneegrenze in den polaren Ländern*. Dr. E. Werth, 639*; *Klima der Gemässigten und Polarzonen*. J. Hann, *rev.*, 935; *Organisation générale de l'Institut Polaire International*. G. Lecoq, 872*; *Project of a Spanish Expedition*, 859; *Polar Exploration*. W. S. Bruce, *rev.*, 785; *Polarforschung im geographischen Unterricht*. Dr. F. Schulze, 228*; ¶ *Maps of Polar Regions: Map of South Polar Regions*. Dr. D. Mawson, *n.*, 712; *Polar Regions showing Routes and Explorations of R. E. Peary, 1892-1906*, 712
- Pole, North: ¶ *The North Pole. Its Discovery in 1909*. R. E. Peary, *rev.*, 214; *Peary Arctic Club Expedition to the — 1908-9*. R. E. Peary, 72* ¶ *Map: Die wichtigsten Nordpolarreisen des XIX und XX Jahrhunderts . . . besonderer Berücksichtigung derjenigen . . . Erreichung des Pols war*. P. Sprigade u. M. Moisel, *n.*, 234
- Polis, Dr. *Luftdruckverteilung über dem Atlantischen Ozean und Bedeutung der drahtlosen Telegraphie für Erweiterung der täglichen Wetterkarten*, 74*
- Pollacchi, Com. P. *Alphabets en usage dans les principales langues . . . Europe centrale et les Balkans . . . transcription phonétique*, 226*
- Polynesia: ¶ *Cannibalism in*. A. P. Rice, 156*; *Trois Archipels de la Polynésie orientale. Samoa; Îles sous le Vent; Marquises*. R. La Bruyère,

- 638*; Polynesians and Melanésians. G. Brown, *rev.*, 463
- Polynesians, Malayo —: Grundlinien einer Vergleichung der Religionen und Mythologien der austronesischen Völker. P. W. Schmidt, 72*
- Polynesian Wanderings. Tracks of Migration Deduced from an Examination of Proto-Samoan Content of Efaté and other Languages of Melanesia. W. Churchill, *rev.*, 265
- Polynoff, B. On Perpetual Congelation and Forms of Ice in the Amur Region. [In Russian], 224*
- Pomerania, Maps: Grösse und Lage der Wohnplätze von Neu-Vorpommern und der Insel Rügen. Dr. E. Müller, 710*; Sturmflut vom 30/31. Dez., 1904 an der Küste Pommerns. Dr. G. Krüger, 710*; Volksdichtekarte von Neu-Vorpommern und der Insel Rügen. Dr. E. Müller, 710*
- Ponty, Gov.-Gen. Situation générale de l'Afrique Occidentale française, 68*
- Poona and Deccan, Our Troubles in. A. Crawford, 319*
- Poor, C. L. Nautical Science in its Relation to Practical Navigation, together with Study of Tides and Tidal Currents, *rev.*, 469
- Popocatepetl. F. L. Waldo, 636*; Excursion a la Caverna de Cacahuamilpa y Ascension al Crater del —. E. Landensio, 236*
- Population, World: Bevölkerung der Erde und ihre Verteilung nach dem Geschlecht. S. Gulischambarov, 559*
- Port-Adelaide, 156*
- Porter, R. P. Dangers of Municipal Trading, *n.*, 943
- Porter, R. W. Map of Yentna Mining District, Alaska, 795*
- Portland Canal District. R. G. McConnell, 949*
- Port Nolloth (Südafrika), 396*
- Portolan Charts, Atlas of. Edited by Dr. E. L. Stevenson, 530
- Porto Maurizio, S. Remo and —. Map, *n.*, 311
- Porto Rico: ¶ Climate of. O. L. Fassig, 790*, 524, 868*; Education in. Hon. Edwin G. Lindsay, 636*; Rainfall. Dr. O. L. Fassig, 448; Report of Commissioner of Education, 1910, 868*; Report of Commissioner of the Interior, 1910, 868*; Tenth Annual Report of the Governor of, 868* ¶ Maps of Porto Rico: Average Annual Extremes of Temperature, 470*; Average Annual Rainfall, 470*; General Progress Sketch, 1909-10, 470*; Mean Annual Temperature and Prevailing Direction of Winds, 470*; Road and Railroad Map of, 632*; Charts U. S. Coast and Geod. Survey: San Juan Passage to Port Humacao and western part of Vieques Island, 309*; Mayaguez Bay and Approaches, 545*
- Port Royal Sound and Savannah River, Chart U. S. Coast and Geod. Surv., 76*
- Port Saïd, 154*
- Ports: Ports germaniques et ports latins, 559*; Seestädte der Erde nach ihren Leistungen im Schiffsverkehr und im Wertumsatz. Dr. A. Oppel, 479*
- Portugal, Présentation d'une carte hypsométrique du — et notice explicative. P. Choffat, 71*
- Portuguese India. See under India.
- Port Wells, Prince William Sound, Glaciers of. U. S. Grant and D. F. Higgins, 321
- Porumbaru. Commission européenne du Danube, 226*
- Posen: Zur Verbreitung und Entstehung der Posener Seen. H. Schütze, 639* ¶ Maps of Posen: Provinzen — und Westpreussen unter besonderer Berücksichtigung der Ansiedlungsgüter, Staatsdomänen, Staatsforsten 1911, 798*; Die räumliche Entwicklung Posen, 958*
- Potonié, H. Zur Genesis der Braunkohlenlager der südlichen Provinz Sachsen, 558*
- Potosi. Prof. H. Bingham, 1
- Pouchet, F. A. Universe, or the Wonders of Creation, 320*
- Poughkeepsie Quadrangle, Geology of. C. E. Gordon, 867*
- Pourquoi Pas? Dr. Charcot presents his vessel to the Department of Public Instruction, 60
- Powder River Coal Field, Wyo. R. W. Stone and C. T. Lupton, 151*
- Powell, E. T. Industrial Development of Canada, 554*
- Powell, F. W., *joint author*, see F. A. Cleveland.
- Powers, L. D. Report of the Sixteenth Annual Meeting, Lake Mohonk Conference on Intern. Arbitr., 1910, 318*
- Pratt, W. E. Eruption of Taal Volcano (abridged), 903
- Pretoria District, Sketch Map showing approximate positions of Kimberlite occurrences in the, 956*
- Prichard, H. H. Across Labrador from Nain to George or Barren Grounds River, 152*
- Prince Charles Foreland, Scottish Ex-

- ploration in — 1906-7. W. S. Bruce, 872*
- Prince Edward Island, Map: Prince Edward Island, Nova Scotia and New Brunswick. R. E. Young, 78*
- Prince William Sound: ¶Glaciers of —. U. S. Grant and D. F. Higgins, 326, 401; Mining and Prospecting in Prince William Sound in 1909. U. S. Grant, 151*
- Principe, Manual Labour in São Thomé and —. F. Mantero, *rev.*, 535 ¶Map of Principe: Carta da Ilha do — com a divisão das principais explorações agrícolas, *n.*, 708
- Prindle, L. M., and F. J. Katz. Geol. Map of Fairbanks District, Alaska, 795*; see also A. H. Brooks, *joint author*.
- Privat-Deschanel, P. En Australie: La Nouvelle-Galles du Sud, 397*
- Prittitz u. Gaffron, Maj. von. Skizze von Unjangwira und den Nachbarlandschaften, *n.*, 797
- Providence Harbor, R. I., Chart U. S. Coast and Geod. Surv., 76*
- Provincetown Harbor, Charts U. S. Coast and Geod. Surv., 158*, 875*
- Prussia: ¶Beobachtungen über Diluvium, Tertiär und Kreide in Ostpreussen. F. Kaunhowen, 558*; Jahrbuch der Königlich Preuss. Geol. Landesanstalt zu Berlin, 1907, 1908, 558*; 1910, 793*; West-Masuren. Dr. C. Kob, *n.*, 144 ¶Maps of Prussia: Geol. Übersichtskarte der Warburger Störungszone, 958*; Glacial geology of the region between the Elbe and Lübeck, 958*; Posen und Westpreussen unter besonderer Berücksichtigung der Ansiedlungsgüter, Staatsdomänen und Staatsforsten, 1911, 798*; Übersicht der veröffentlichten Messischblätter, 798*
- Puget Sound Basin, Climate of. Prof. E. J. Saunders, 619; Terminal Moraine of Puget Sound Glacier. J. H. Bretz, 714*
- Pullar, L., *joint author*, see Sir John Murray.
- Pullé, Dr. G. Fenomeni idrologici e climatologici nel bacino della Senna, 559*
- Pulliam, W. E. Dominican Cacao, 395*
- Puls, E. Vergleichende Untersuchungen über Flusssedimente, *n.*, 705, 720*
- Puna, Region de la. Demarcación de Límites con Chile. Mapa prel. Z. Sánchez and T. Loos, 955*
- Punjab: Lakes of the Salt Range. T. H. D. LaTouche, 225*
- Purcell Range of British Columbia, Across the. Dr. T. G. Longstaff, 868*, Map, 633*
- Purdue, A. H. Collecting Area of Waters of hot springs, Hot Springs, Ark., 151*; Recently Discovered hot springs in Arkansas, 867*; see also E. F. Burchard, *joint author*.
- Puritans, History of the — in England, and the Pilgrim Fathers. W. H. Stowell and D. Wilson, 239*
- Puys, Migration de la ligne de partage des eaux dans la chaîne de. Ph. Glangeaud, 638*
- Pygmies: Stellung der Pygmäenvölker in der Entwicklungsgeschichte des Menschen. P. W. Schmidt, 479*
- Pyrenees: ¶Letters from the Pyrenees during . . . 1842. T. C. Paris, 239*; Observations, Moral, Literary, and Antiquarian . . . Tour through the —, South of France, etc., 1814-15. John Milford, Jun., 238*; Pau and the —. Count H. Russell, 320*; Travels in the Pyrenees, etc. Ramond [L. F. E. de Carbonnières]. Translated by F. Gold, 239*; Variations périodiques des glaciers, 1909. Alpes françaises et Pyrénées. C. Rabot, 558*
- Pyrénées, Hautes. See Hautes-Pyrénées.

Q.

- Qualtrough, K. Fascination of Geography, 794*
- Quebec: ¶Le chemin de fer de Matane et Gaspé. N. Le Vasseur, 715*; Une expédition dans l'Abitibi. F. La-liberté, 715*; Geologic Reconnaissance along the line of National Transcontinental R.R. in western —. W. J. Wilson, 949*; Logging Operations. B. Winegar, 152*; North-western — adjacent to Interprovincial Boundary and the National Transcontinental R.R. M. E. Wilson, 949*; Paroisse de St. Romuald d'Etchemin. L'abbé B. Demers, *n.*, 924; Raised Beaches of southern —. J. W. Goldthwait, 949*; La Richesse forestière de la province de Québec. Hon. J. Allard, 554*; Serpentine Belt of Southern —. J. A. Dresser, 948* ¶Maps of Quebec: Carte régionale, comprenant les Comtés de Témiscouata, Kamouraska, etc. A. M. Taché, 633*; Carte régionale . . . comprenant les Comtés de St. Maurice, Maskinongé, Berthier, etc. A. M. Taché, 633*; La Vallée du Lac Saint-Jean, 634*

Quebracho, Beiträge zur Kenntnis des — gebietes in Argentinien und Paraguay. Dr. R. Lütgens, 715*

Queensland: ¶ Bananas in Tropical, 289; Certain Mines and Minerals in North. L. C. Ball, 557*; Coal Measures of South East Moreton. E. O. Marks, 557*; Field Notes on Mount Flora Gold and Mineral Field. L. C. Ball, 557*; Flower-Hunter in — and New Zealand. Mrs. Rowan, 319*; Introduction of Economic Plants into. J. F. Bailey, 225*; Some Mineral Fields on the Hinterland of Mackay: Mount Spencer, etc. L. C. Ball, 557* ¶ Maps of Queensland: Geol. Map of South East Moreton Coal Measures, 310*; Geol. Sketch Map of Northern Part of Annan R. Tin Field. L. C. Ball, 311*; Sketch Map of N. E. Australia showing Area with Flowing Wells and the Distribution of supposed Intake Beds in, 798*; Sketch Map of East Central —. Gold Mineral and Coal Fields, between Rockhampton, Gladstone and Dawson and Mackenzie Rivers. W. H. Greenfield, 311*

Quelle, Dr. O. Personal, 529

Quiggin, A. H., *joint author*, see A. C. Haddon.

Quin, M. J. Steam Voyages on the Seine, the Moselle & the Rhine with Railroad Visits to . . . Cities of Belgium, 239*

Quirigua. V. M. Cutter, 554*

R.

Rabot, C. Afrique Occidentale Française: Le Commerce en 1909, 314*; Découverte de gisements de glace fossile à la Nouvelle-Zemble et au Spitzberg, 479*; Recul du pin sylvestre dans les montagnes de la Suède, 719*; Revue de Glaciologie, 317*; Variations périodiques des glaciers, 1909. Alpes françaises et Pyrénées, 558*

Radcliffe, W. (*Translator*). Journey through Sweden . . . particulars relating to History of Denmark, etc. Written in French by a Dutch Officer, 1790, 239*

Radford, H. V. Expedition in northern Canada, 134, 777

Radomir-Küstendil, Situationsplan der Eisenbahnstrecke — in Bulgarien, 79*

Rae, W. F. Westward by Rail: The New Route to the East, 400*

Railroads. See also Transportation: ¶ America: Pan American Railway, 413*; Unternehmen der panamerikanischen Bahn. R. Hennig, 313* ¶ North

America: Chemin de fer de Matane et Gaspé. N. Le Vasseur, 715*; Comparison of Trans-Appalachian R.Rs. A. E. Parkins, 314*; Economic Phases of Railroad Rate Controversy. A. M. Sakolski, 317*; Progress of the Grand Trunk Pacific R.R., 917; Annual Report Statistics for 1909, 394*, for 1910 (U. S.) Compared with Official Rep. for 1909 and Recent Stat. of Foreign Railroads, 554*; Hudson Bay Railroad, 152*; New Transcontinental R.R., 519; Earning Power of Railroads, 1909. Compiled by F. W. Mundy, n., 218 ¶ Map: Sketch Map of Part of Railway Belt, British Columbia, 230* ¶ Central and South America: Von der chilenischen Längsbahn. Dr. H. Polakowsky, 153*; Développement de chemins de fer au Brésil, 395*; Ferrocarril de Guaira a Caracas. J. Flind, 636*; Guatemalan Railroad Construction. E. F. Tisdell, 395*; Madeira-Mamoré R.R. P. H. Ashmead, 636*; Territoire fédéral l'Acre et la ligne du Madeira au Mamoré. P. Walle, 636* ¶ Maps: État actuel des voies ferrées dans l'Amérique Centrale, 634*; Map of railways of Argentina in 1909, 231* ¶ Africa: Achèvement du chemin de fer de la Guinée française. Océan relié au Niger, 68*; Guinée Française: Chemin de fer et Progrès. E. Salesses, 154*; Chemin de fer de Guinée française. A. Arcin, 716*; Chemin de fer de Konakry au Niger. A. Terrier, 154*; Chemins de fer nationaux vers le Katanga. L. Goffin, 153*; Le "Livre gris" sur la question des chemins de fer du Congo, 791*; Matadi-Leopoldville R.R., 620; East African Central R.R., 368; Extending the Sudan R.R., 54; Zur Geschichte der äthiopischen Eisenbahnen. A. Ilg, 67*; Unsere Kameruner Eisenbahnen. E. Walter, 314*; Kameruner Südbahn, 396*; Madagascar R.R., 620; Railway Projects in South Africa, 155*; Railroads in West Africa, 54; Le Transafricain de Matadi à Dar-Es-Salam. A. J. Wauters, 716*; Le Transcongolais, 791*; Transkontinentale Bahnen und die Kap-Kairo-Linie. Dr. R. Hermann, 153*; Vallée de la Lukuga et le chemin de fer du Tanganika. A. Delcommune, 790*; Verbindungswege zwischen Deutsch-Südwestafrika und Betschuanenland Eisenbahn. F. Seiner, 154* ¶ Maps: Carte du Réseau complet des chemins de fer projetées en Afrique Occiden-

- tale Française, 797*; Chemin de fer de Guinée et ses rapports économiques avec le Cours du Niger, 956*; South Africa, showing railways, *n.*, 79
- ¶Asia: Afghanische Bahnprojekt. Dr. E. Zugmayer, 155*; Aspect présent de la question du Bagdad. R. de Caix, 637*; Bagdadbahn, 637*; Chemin de fer du Siam, 792*; Chemin de fer du Yunnan. J. Rodés, 792*; Ferrovie della Manciuria e l'Accordo Russo-Giapponese. E. Catellani, 224*; Au pays du chemin de fer de Bagdad. H. Viollet, 951*; Emprunt pour les chemins de fer Hankéou-Canton et Hankéou-Seu-Tchouan, 951*; Le progrès du Transsibérien. P. Labbé, 224*; The proposed Trans-Persian R.R. Lieut.-Col. A. C. Yate, 717*
- ¶Europe: Jahres-Bericht der K. Bayer. Staatseisenbahn Verwaltung, 1909, 398* ¶Maps: Mitteleuropäische Eisenbahnnetze beim Ausbruch des deutsch-französischen Krieges, 710*; Situationsplan der Eisenbahnstrecke Radomir-Küstendil in Bulgarien, 79*
- Raimondi, Itinerario de los viajes de — en el Perú, 715*
- Rain: ¶Beziehungen zwischen Regenfall u. Quellergiebigkeit, usw. Dr. L. Frank, 871*; British Isles. Mean Annual Rainfall. Dr. H. R. Mill, *n.*, 551; British Rainfall, 1908 and 1909. Dr. H. R. Mill, *rev.*, 539; Über die extremen Schwankungen des Regenfalles. Dr. G. Hellman, 73*
- Ramírez, José Fernando. Mexico durante su Guerra con los Estados Unidos. Documentos inéditos . . . pub. por G. García, 480*
- Ramond [de Carbondnières, L. F. E.]. Travels in the Pyrenees, etc., translated by F. Gold, 239*
- Rampal, A. Lorraine française et Lorraine allemande, 478*
- Randall-MacIver, D., *joint author*, see C. L. Woolley.
- Rane, F. W. Reforestation in Massachusetts, 789*
- Range, Dr. P. Deutsche Süd-Kalahari, 869*; Das Lüderitzland, 716*
- Rappahannock River, Charts U. S. Coast and Geod. Survey, 158*, 545*, 631*
- Raritan River. From Raritan Bay to New Brunswick, Chart U. S. Coast and Geod. Surv., 309*
- Rasser, Dr. E. O. Waldbrände und die Möglichkeit ihrer Bekämpfung, 872*
- Rathbun, M. J., H. Richardson, *et al.* Crustaceans (Harriman Alaska Series), 480*
- Ray, J. Collection of Curious Travels and Voyages, 320*
- Reck, H. Glazialgeologische Studien über die rezenten und diluvialen Gletschergebiete Islands, 793*; Übersichtskarte der Gletschergebiete von Island, 711*
- Record, Geographical, 51, 130, 195, 283, 365, 447, 518, 618, 685, 775, 854, 916
- Reed, J. H. Cotton-Growing within the British Empire, 792*; Geographical Aspects of the Problem of Empire Cotton Growing. J. H. Reed, 399*
- Reed, W. G., Jr. Study of Phenomenal Climatology, 372
- Reed, W. J., *joint author*, see J. A. Taff.
- Reeds, C. A. Report on Geological and Mineral Resources of Arbuckle Mts., Okla., 880*
- Reeves, E. A. Maps and Map-Making, *rev.*, 213; Note on Map of S. Peru and N. Bolivia, 395*
- Refrigeration: Resultados obtenidos en el Segundo Congreso Internacional del Frio. E. Frers, 873*
- Reichard, A. C. Hydrographische Beobachtungen der schwedischen Expedition nach Spitzbergen, 872*
- Reichert, Dr. F. Forläufiger Bericht über die Resultate der Juncal-Expedition in den Anden, 868*; Penitentschneefelder im Gebiet zwischen Aconcagua und Tupungato, 475*
- Reid, H. F. Variations of Glaciers, 318*; Variations périodiques des glaciers. XV Rapport 1909. États-Unis [in English], 635*
- Reid, J. A. Geomorphogeny of the Sierra Nevada Northeast of Lake Tahoe, 553*
- Reid, R. L. Chart of River Aruwimi, 797*
- Rein, G. K. Anglo-Aegyptischer Sudan, 153*; Englische Bewässerungsanlagen in Aegypten und im Sudan mit besonderer Berücksichtigung des Assuan-Staudammes, usw., 395*
- Reinecke, L. Beaverdell District, B. C., 949*
- Reinhard, A. v. Zur Lage der Schneegrenze im Kaukasus, 871*
- Rendle, A. B., *joint author*, see W. Fawcett.
- René-Leclerc, Ch. Commerce extérieur du Maroc (1909), 790*; La situation économique du Maroc, en 1908-09, 476*; — de Tétouan, 716*

- Renfors, A. Finnish Self-Taught. Thimm's System, *n.*, 149
- Reno Region, Nev., Geology and Oil Prospects in. R. Anderson, 474*
- Renty, E. de. L'Angleterre en Afrique, *n.*, 781; Chemin de fer dans la Somalie italienne, 716*
- Réunion: ¶ Statistiques du Commerce pour l'année 1908; 791*; La Réunion, 316*
- Reviews and Notices, 61, 139, 205, 295, 373, 455, 531, 625, 693, 781, 863, 923
- Révil, J. Glaciations des Alpes françaises, 477*
- Rhine Province: ¶ Städte des rheinisch-westfälischen Industriebezirks. Dr. K. Olbricht, 398*
- Rhine: ¶ Am Ursprung des Rheins. O. Rögnér, 871*; Rhine and Mississippi R. Terminals. E. J. Clapp, 714*
- Rhodes, Cecil. His Private Life. P. Jourdan, *rev.*, 536
- Rhodesia: ¶ Rhodesia. A. R. Colquhoun, 68*; A Geyser in South Africa. Prof. P. D. Hahn, 717*; Progress of, 155*; Rhodesia Notes, 68*
- Northeast Rhodesia: Sul Lago Bangweolo. Capt. M. Piscicelli, 68*
- ¶ Map: Sketch Map of Southeast Corner of Bangweulu Swamps inhabited by Wa-Unga, showing channels connecting the Chambeshi and Luapula Rivers. F. H. Melland, 956*
- Southern Rhodesia: Agricultural Labor Conditions in. H. M. Hole, 476*; Viktoriafälle des Sambesi und ihre Umgebung. J. Brunnthaler, 717*
- Rhône, Essai sur les Glaciers et sur le terrain erratique du bassin de. J. de Charpentier, 238*; Navigation actuelle du Rhône, ses améliorations possibles et leur influence au point de vue du commerce international. P. Clerget, 793*
- Ricard, F. Transformations de Tunis sous le Protectorat français, 155*
- Ricco, A. Rôle de l'eau dans les phénomènes éruptifs, 74*
- Rice, A. P. Cannibalism in Polynesia, 156*
- Rice, H. Forschungsreise des Dr. — im Flussgebiet des Rio Caiary-Uaupés. T. Koch-Grünberg, 950*
- Rice, Prof. W. N. Geological and Natural History Survey of Connecticut, 521
- Rich, J. L. Physiography of Bishop Conglomerate, S. W. Wyo., 66*, 133
- Richard, J. Campagne scientifique de la Princesse-Alice. Liste des Stations, 399*
- Richards, R. W. Central Part of Bull Mountain Coal Field, Mont., 221*; — and J. H. Bridges. Sulphur and Pyrite, 789*; see also H. S. Gale, *joint author*.
- Richardson, G. B. Trinidad Coal Field, Col., 151*
- Richardson, H., *joint author*, see M. J. Rathbun.
- Riedel, J. Neue Studien über Isochronenkarten, 953*
- Ries, H. Clay and Shale Deposits of Western Canada, 949*; Economic Geology, *rev.*, 219
- Rieznichenko, Bl. Glacial Group of Muss-Tau. [In Russian], 224*
- Riggs, Prof. A. S. Lecture on Sicily and Southern Italy, 283
- Rio de Janeiro: ¶ La métamorphose de la capitale du Brésil. J. A. Georgette, 790*; Boletim mensal do Observatorio de Rio de Janeiro [full tables of meteor. observations, April-Dec., 1908], 152*; Le port de — et ses travaux d'amélioration. Comm. G. Bourge, 868*
- Rio Grande. Stream Waters of Western U. S., with chapters on Sediment carried by the — and Industrial Application of Water Analyses. H. Stabler, 948*
- Rio Grande do Sul, Navegação na costa do. A. Alves Dos Santos, 715*
- Rio Pilcomayo, Carte de la région des marais du — et du Rio Confuso. A. Schied et Arnold, 67*
- Ripley, W. Z. European Population in the U. S., 474*
- Riso Patron, L. Republica de Chile (Maps), *n.*, 159
- Ritz, H. B. Speech of Tasmanian Aborigines, 226*
- Rivers: ¶ Écoulement fluvial et dénudation, d'après les travaux de l'U. S. Geol. Surv. H. Baulig, 560*; Gliederung der Flusseises und die Arten seiner Erscheinungen, 318*; Vergleichende Untersuchungen über Flussdichte. E. Puls, 720*
- Rivet, Dr. P. Recherches anthropologiques sur la Basse-Californie, 635*
- Roanoke R. Drainage Basin, 475*
- Robb, J. Hampden, *Obituary*, 294
- Robertson, A. Bryozoans (Harriman Alaska Series), 480*
- Robertson, A. W. D., *joint author*, see R. J. A. Berry.
- Robertson, Dr. J. W. Conservation of Agricultural Resources [Canada], 554*
- Robinson, E. Van Dyke. Commercial Geography, *rev.*, 384
- Robinson, H. H. Single Cycle De-

- velopment of Grand Canyon of the Colorado, 948*; see also H. E. Gregory, *joint author*.
- Robson, Mount, Attempt on. L. S. Amery, 222*
- Rock Springs Coal Field, Wyo., Southern Part of. A. R. Schultz, 151*
- Rocks: ¶Pre-Cambrian Rocks of Bow River Valley. C. D. Walcott, 222*
 ¶Maps of Rocks: Dessin-modèle du rocher en haute montagne: le Cirque du Creux Noir (Vanoise), *n.*, 960; Map of Southern Appalachian Valley, showing Outcrops of Ordovician Rocks, 954*; Sketch Map of Four Great "Rock-groups" of the Alps. After Prof. Steinmann, 798*
- Rockwell, F. I. White Pines of Montana and Idaho—Their Distribution, Quality and Uses, 867*
- Rocky Mountains: ¶Highways and Byways of. C. Johnson, *rev.*, 373; Rambles in the. M. O'Connor Morris, 400*; Streifzüge in den Rocky Mountains. C. L. Hennig, 474*
- Rodes, J. Chemin de fer du Yunnan, 792*
- Rodriguez, J. Galbiss y. Ensayo de los Métodos fotogramétricos en el Término municipal de Otero de Herberos (Provincia de Segovia), 960*
- Röger, J. Bergzeichnung auf den älteren Karten, 480*
- Rogers, W. Raised Beaches and Head of the Cornish Coast, 316*
- Rögner, O. Am Ursprung des Rheins, 871*
- Romani, J. F. Carta de la región abarcada por el temblor del 26 de Marzo de 1908 [Mexico], 159*
- Rome: The Streets of. Contessa Gautier, 793* ¶Maps of Rome: Dintorni di Roma, *n.*, 393; Exhibit of Plans of, 688; Pianta di Roma, *n.*, 393
- Romer, Prof. E. von. Flüchtige Reiseindrücke aus dem Innern und von den Rändern Asiens, 637*
- Romero, A. A. Estudio geológico de nuestro continente [South America], 950*
- Romero, C., and F. E. Ross. Production of Rubber in Peru, 636*
- Romeu, M. A. de. Deux Voyages dans l'Amérique du Nord, 554*; Voyage au Congo, 314*
- Roosevelt, T. African Game Trails, *rev.*, 205
- Rose, J. N. Studies of Mexican and Central American Plants, 636*
- Rosell, R. G. La ciencia y los temblores, 715*
- Ross, C. E., *joint author*, see C. Romero.
- Ross, F. E. Petroleum Industry in Peru, 555*
- Rosse, I. C., J. Muir *et al.* Cruise of Revenue-Steamer Corwin in Alaska and the N. W. Arctic Ocean in 1881, 720*
- Rossini, C. C. Principali studi pubblicati in occasione della missione Duchesne-Fournet, 67*
- Rotch, A. L., *joint author*, see L. Teisserenc de Bort.
- Rothaug, J. G. Geog. Volksschul-Atlas usw., *n.*, 713; — und H. Trunk. Schulwandkarte des Herzogtums Steiermark, *n.*, 311
- Rothpletz, A. Über die Ursachen des Kalifornischen Erdbebens von 1906, 714*
- Rottmann, H. Murmanische Küste, 719*
- Rouch, J. Expédition Antarctique du Dr. Charcot . . . (1908-1910). Principaux résultats d'océanographie physique, 872*
- Rouen, Les ouvriers du coton dans la région de. J. Levainville, 558*
- Rouillard, E. Région de Mistassini, 152*
- Rousiers, P. de. Les grands Ports de France, leur Rôle économique, *rev.*, 702
- Roux, Dr. J. Iles Arou et Kei, 156*
- Rowan, Mrs. A. Flower-Hunter in Queensland and New Zealand, 319*
- Royal Geographical Society, Suggestions for the Future Work of. Maj. L. Darwin, 779
- Rubber. See also Para Rubber: ¶Kautschukkultur in Mexico. H. J. Ludwig, 67*; Rubber Workers of the Amazon. A. Lange, 33 ¶Map: Kautschuk-Weltkarte 1911, *n.*, 473
- Rudaux, L. La pluie en France en 1910, 638*
- Rudolph, Dr. E. Beziehungen zwischen tektonischen und seismischen Verhältnissen Ostasiens, 70*
- Ruedemann, R. On Symmetric Arrangement in the Elements of Paleozoic Platform of North America, 221*; see also H. P. Cushing, *joint author*.
- Rügen, Map: Grösse und Lage der Wohnplätze von Neu-Vorpommern und Rügen, Volksdichtkarte von —. Dr. E. Müller, 710*
- Rühl, A. Über Grundlagen der Landeskunde von Spanien, 227*
- Rumania: ¶Description de la distribution géographique du pétrole en Roumanie. M. Nicolesco, 871*; Pe-

- treoleum Investigations in Hungary and —, 859; Situation économique de la Roumanie, 71*; Studien in den Kalkmassiven des Appennin, 639*
- Rumphius, G. E. Ambonsche Historie, 224*
- Rung, Dr. R. Verbreitung der Bananenkultur (Map), 713*
- Runic Monuments, The old Northern — of Scandinavia and England, now first Collected and Deciphered by G. Stephens, 320*
- Russell, Count H. Pau and the Pyrenees, 320*
- Russell, W. S. C. Jan Mayen Expedition of 1911, 881; Physiographical Features of Iceland, 489
- Russia: ¶ Annual of Meteorol. and Magnetic Observatory of the Imp. Univ. at Odessa, 1908, 316*; Über den Einfluss niedriger Bodentemperatur auf die Vegetation. Prof. G.-J. Tanflief, 72*; Empires and Emperors of Russia, etc. Count Vay de Vaya and Luskod, 319*; Geological and Mineralogical Annual of. [In Russian], 719*; *Liesnoye Dielo* [Forest problems in the North], 316*; *Projet du Levé magnétique de l'Empire Russe et les travaux magnétiques*. M. Rykatchev, 793*; *Projet de transcription des noms géographiques de l'empire russe sur la future carte intern. du monde au millionième*. D. Aïtoff, 478*; *Recueil des nivellements des chemins de fer . . . comme base des travaux hypsométriques*. Gen. J. de Schokalsky, 71*; *Russische Grossschiffahrtswege*. Dr. R. Hennig, 871*; *Empire and Czarism*. V. Bérard, 319*; *Russie et la Chine*, 637*; —, *Pologne et Finland*. *Tableau statist.*, géog., etc. . . monarchie russe prises isolément. J.-H. Schnitzler, 239*; — and Turkey in the Nineteenth Century. E. W. Latimer, 320*; With Russian, Japanese and Chunchuse. *Experiences of an Englishman during the Russo-Japanese War*. E. Brindle, 320*; *Town and Village in European Russia*. *Sketch of Economic Geography*. [In Russian.] B. P. Semenov, 316*; *Review of above in French*, 719*; *Variations périodiques des glaciers*, 1909, Russie. J. de Schokalsky, 559*; *Russia in Asia*. See under Asia ¶ *Maps of Russia: Distribution of Population and location of towns in European —*. [In Russian.] B. P. Siemenov, *n.*, 311; *Meteor. Maps accompany "Ausbreitung kalter Luft in Russland und Nordasien,"* 879*; *Shiffahrtswege Russlands*, 711*; *Six Charts of the Russian Coasts*, Hydrographic Office Pub., 798*
- Russian Turkestan. See under Turkestan.
- Russier, H., et H. Brenier. *L'Indochine française*, *rev.*, 931
- Ruvenzori, Height of. Capt. E. O. Henrici, 918
- Rux, W., *joint author*, see F. Jaeger.
- Rykatchev, M. *Projet du Levé magnétique de l'Empire Russe*, etc., 793*
- S.
- Saad, Dr. L. Jaffa, 155*
- Saane, R., Map: *Trois "boucles" de la Sarine. Levé à la règle à échimètre*. C. Calciati, 959*
- Sacco, F. *Appennino settentrionale e centrale*, 793*; *Schizzo geotettonico dello Appennino settentrionale e centrale secondo i rilevamenti di*, 311*
- Sachse, Kapn. F. J. P. *Schetskaart van het, Sentani-Meer, Noord Nieuw-Guinea*, *n.*, 957
- Sächsisch-Thüringischer Verein für Erdkunde zu Halle, *Mitteilungen des*, 227*
- Sacrificios, Island of (Mexico). Z. Nuttall, 222*
- Saderra Masó, Rev. M. *Seismic Centers of Samar, Leyte, and E. Mindanao*, 557*
- Saga of King Sverri of Norway. Translated by J. Sephton, 239*
- Sagonds, Lieut. Casablanca: *Monographie de la Chaouïa*, 476*
- Sahara: ¶ *De l'Adrar à la Baie du Lévrier*. Lieut. Mugnier-Pollet, 556*; *Austrian Expedition to*, 55; *La Conquête du Sahara. Essai de psychologie politique*. E. F. Gautier, *rev.*, 695; *Depressioni ad Oriente del Ciad*. L'Eguei ed il Toro. L. Cufino, 69*; *La France et la Turquie dans le Sahara oriental*. E. Rouard de Card, 480*; *French Sahara*. N. Villate, 526; *French Military Reconnaissances in*, 854; *Jonction du territoire de Zinder*. Lieut. Detchebarne, 69*; *Les Oasis des Zibans*. A. de Claparède, 315*; *Oberflächengestaltung und Hydrographie des saharisch-sudanischen abflusslosen Gebiets*. H. Marquandsen, 556*; *La question du Tibesti*. R. de Caix, 717*; *Sahara algérien*. E. F. Gautier, *rev.*, 140; *Le Sahara Soudanais*. M. Zimmermann, 717*; *A travers le Sahara*. N. Villate, 637*
- ¶ *Maps of Sahara: Croquis schématique des régions de l'Ouest du cercle Colomb*. Lieut. Bernard, 78*; *D'In-*

- salah au Niger par l'Ahaggar, 391*;
 Itinéraire du Capitaine Cortier dans l'Adrar, 79*;
 Reconnaissance des Compagnies sahariennes du Touat et de la Saoura dans les Ergs Atimine, etc., 877*;
 Sahara Oriental, 955*
 Saïd, Port. See Port Saïd.
 Sailing Vessels: ¶ Clipper Ship Era. Epitome of Famous American and British Clipper Ships . . . 1843-1869. A. H. Clark, *rev.*, 542
 St. Andrew Sound, Ga., Chart U. S. Coast and Geod. Surv., 545*
 Saint Anthony Falls, Hennepin at the. N. H. Winchell, 714*
 Saint-Die's Celebration of printing of Waldseemüller's *Cosmographiae Introductio*, 290
 St. George R. and Muscle Ridge Channel, Maine, Chart U. S. Coast and Geod. Surv., 309*
 St. Helena, Progress of, 316*
 Saint John Lake, Map: La Vallée du Lac Saint-Jean, 634*
 St. John R., Fla., from Jacksonville to Hibernia, Chart U. S. Coast and Geod. Surv., 545
 St. Lawrence R. Basin, 1909. C. C. Covert, A. H. Horton and R. H. Bolster, 635*
 St. Louis and Vicinity, Studies in Glacial Geology in. J. A. Drushel, 867*
 St. Louis Quadrangle, Geology and Mineral Resources of. N. M. Fennerman, 788*
 Saint-Martin, V. de et Fr. Schrader. Atlas Univ. de Géog., Indo-Chine, n., 552; Mongolie; Maroc; Égypte et Soudan Égyptien, 312
 Saint-Palais-sur-Mer, Monographie de la commune de. D. Morin, 871*
 Saint-Pierre et Miquelon, Statistiques du Commerce . . . 1908, 789*
 St. Romuald d'Etchemin, Paroisse de. L'abbé B. Demers, n., 924
 Saint-Véran, Le village de. R. Blanchard, 315*
 Sakolski, A. M. Economic Phases of Railroad Rate Controversy, 317*
 Salesses, E. Guinée Française: Chemin de fer et Progrès, 154*
 Salinas, Fr. F. C. Distrito de Luna-huaná, Provincia de Cañete, 715*
 Salisbury, R. D. Elementary Physiography, *rev.*, 386; Physiography in the High School, 399*
 Salomon, W. Adamellogruppe, ein alpines Zentralmassiv, und seine Bedeutung für Gebirgsbildung, etc., 478*
 Saltoro Pass. T. G. Longstaff, 792*
 Salt Plain: Nel piano del Sale. [In Abyssinia.] A. M. Tancredi, 639*;
 Aridity, Salt Deposits and Currency, 692
 Salt Range, Lakes of the — in the Punjab. T. H. D. LaTouche, 225*
 Salvador: Balsam of Peru. A. Hale, 790* ¶ Map: Balsam Coast of, 546*
 Samar, Charts U. S. Coast and Geod. Surv.: Guiuan Harbor, South Coast of Samar, 875*;
 — and Leute. Calbayog to Tacloban, 309*;
 Southern Part of, 158*
 Samné, Dr. G., and Y. M. Goblet. Vie politique Orientale en 1900, n., 934
 Samoa: ¶ Handel der afrikanischen Kolonien und Samoas, [German], 1909, 68*;
 Der Handel Samoas. R. Deeken, 226*;
 Pflanzungsbetriebe auf, 558*;
 Trois Archipels de la Polynésie orientale. Samoa, Îles sous le Vent; Marquises. R. La Bruyère, 638*
 Sánchez, Z., and T. Loos. Demarcación de Límites con Chile (Map), 955*
 Sand Dunes: ¶ Les dunes continentales de Moret-sur-Loing, front oriental de la forêt de Fontainebleau. C. Duffart et F. Bergeron, 718*;
 Fixation of the Dunes on the Coast of Jutland. W. J. Morrill, 718*;
 Genesis and Development of Sand Formations on Marine Coasts. P. Olsson-Seffer, 953*;
 Hollandsche Duinen, Grontwater en Bodemdaling. E. Dubois, 719*;
 Über Stranddünen und ihre Befestigung. W. Stavenhagen, 872*;
 Studien über nordostdeutsche Inlanddünen. Dr. F. Solger, n., 144
 Sandström, J. W. On the Relation between Atmospheric Pressure and Wind, 872*
 Sanford, C. M. Wisconsin Lead and Zinc District, 474*
 Sanford, Le Général. Reconnaissance de l'Association du Congo. A. J. Wauters, 791*
 Sanford, S. Saline Artesian Waters of the Atlantic Coastal Plain, 553*
 San Francisco, Topographic Environment of. R. S. Holway, 789* ¶ Charts U. S. Coast and Geod. Surv.: San Francisco Entrance, 309*;
 Southern part of, 631*
 San José de Costa Rica. Dr. M. S. Soriano, 554*
 San Juan Passage to Port Humacao and western part of Vieques Island, Chart U. S. Coast and Geod. Surv., 309*
 San Luis Pass to Matagorda Bay, La., Chart U. S. Coast and Geod. Surv., 631*
 San Pedro del Gallo (Durango),

- Estudio Geológico de la Region de Dr. C. Burckhardt, 222*
- San Remo-Porto Maurizio, Map, *n.*, 311
- Santa Fé R. R., Geological Work along the. N. H. Darton, 195
- Santarem, O 2° Visconde de — e os seus Atlas Geographicos. J. A. de Freitas, *n.*, 215
- Santa Rosa Island to Point Buchon, Cal., Chart U. S. Coast and Geod. Surv., 631*
- Santee R. Drainage Basin, 222*
- Santi, E. Ascensions nouvelles dans le Dauphiné, 793*
- Santiago, Catálogo del Archivo de la Real Audencia de, 720*
- Santo Domingo: ¶Dominican Cacao. W. E. Pulliam, 395*; Foreign Commerce of the Dominican Republic in 1910, 636*; Trade, Industries, Railways and Ports of, 395*
- Santolalla. See Mataga Santolalla.
- São Paulo: ¶Dados climatológicos do Verão de 1908. J. N. B. Mattos, 223*; do Anno de 1909. J. N. B. Mattos, 790*; Economic Climatology of the Coffee District. R. DeC. Ward, 428; L'élevage dans l'État de. L. Misson, 950*; Das Flussgebiet der Ribeira de Iguape im Süden des Staates S. Paulo. G. Stutzer, *rev.*, 695; Revista do Museu Paulista. Vol. VIII. H. v. Ihering, 960*; ¶Map of São Paulo: Three Climatological Maps, *n.*, 547
- São Sebastião e Rio Juquiriqueré, Planta do Littoral de, *n.*, 955
- São Thomé and Principe, Manual Labour in. F. Mantero, *rev.*, 535; Map, 708*
- Sapper, Dr. K. Buka. Nach Aufnahmen von Dr. G. Friederici und Schön sowie Beobachtungen von —, 226*; Map, *n.*, 233; Durchquerung von Bougainville, 226*; Map, *n.*, 233; Geographische Bedeutung der Vulkane, 74*, Höhenschichtenkarte von Neu-Hannover, *n.*, 232; Geol. Kartenskizze von Buka, *n.*, 233; Nachrichten über den Ausbruch des Matavanu auf Savali, 1909-10, 638*; Übersichtskarte von Neu Mecklenburg u. Nachbargebieten, Übersichtsk. der ungefähren Volksdichte auf, Verbreitung der Vegetationsformationen (map), *n.*, 232; Höhenschichtenkarte u. Geol. Kartenskizze von nord u. Süd Neu Mecklenburg, *n.*, 232
- Sarasin, P. Über Wüstenbildungen in der Chelléen-Interglaciale von Frankreich, 226*
- Sargasso Sea, Sea Weed in. Dr. J. J. Stevenson, 691
- Sargeson, Prof. F. W., Personal, 623
- Sarine: See Saane.
- Saskatchewan, Maps: Alberta and — Map to show Portions explored in 1908-9, 310*; Indexed pocket Map of, accompanied by reference index, 796*; Index to Townships in Saskatchewan, Alberta, etc., 230*, *n.*, 390; Manitoba — and Alberta, Cereal Maps of, *n.*, 159; Sketch Map showing topography of 3rd Mer. from Township 52 to 60 and of 16th Base Line; the 15th Base Line between 3rd and 4th Mer., 390*
- Saskatchewan R. District. W. McInnes, 949*
- Saunders, Prof. E. J. Climate of Puget Sound Basin, 619
- Savaii: ¶Ascent of Matavanu in. T. Anderson, 225*; Besuch des Vulkans auf der Samoa-Insel —. Oberleut. Schnoeckel, 792*; Der jüngste Vulkanausbruch auf. A. Klautzsch, 558*; Nachrichten über den Ausbruch des Matavanu 1909-10. Prof. Dr. K. Sapper, 638*
- Savannah River Drainage Basin, 394*
- Savannah to Sapelo Island, Chart U. S. Coast and Geod. Surv., 158*
- Savoy, Relation of a Journey to the Glaciers in the Dutchy of. T. Bourrit (1776), 238*
- Saxony, Province: ¶Zur Genesis der Braunkohlenlager der südlichen Provinz Sachsen. H. Potonié, 558* ¶Maps: Strassen-Karte der Provinz Sachsen, *n.*, 234; Verbreitung der Salzflora in Anhalt, Provinz-Sachsen usw., 958*
- Scandinavia, Upper Limits of Forest Trees in, 689
- Schaeffer, Mrs. C. Lecture on "At the Sources of the Athabaska and Saskatchewan Rivers," 195
- Schäfer, R. Hochtouren in den Alpen, Spanien, Nordafrika, Kalifornien und Mexico, 320*
- Schanz, M. Wirtschaftliche Verhältnisse in Ägypten und dem — Sudan, 950*
- Schardt, Prof. H. Dérivations glaciaires de cours d'eau dans la Suisse occidentale et le Jura français, 71*
- Scharff, R. F. On Evidences of a Former Land-Bridge between Northern Europe and America, 228*
- Scheibbs, Bergstürze des Mai 1910 in der Umgebung von. Dr. G. Göttinger, 71*
- Scheil, P., Conférence . . . sur les fouilles et l'histoire de la Babylonie, Assyrie et de l'Elam, 791*
- Scheldt: Zur Geschichte und Natur der Schelde-Mündungen in der Nieder-

- länd. Provinz Zeeland. F. Müller, 952*; Het Scheldediluvium. Dr. J. Lorie, 639*
- Schenk, Dr. A. Étude sur l'anthropologie de la Suisse, 478*; *Obituary*, 204
- Scheu, Dr. E. Vorläufiger Bericht über eine Studienreise nach der Insel Corsica, 397*
- Schiaparelli, C. Ibn G'unayr. Viaggio in Ispagna, Sicilia, Siria, Palestina, Mesopotamia, etc. Prima traduzione ... Arabo da —, *rev.*, 216
- Schiebel, W., *joint author*, see E. C. Abendanon.
- Schiffer, Capt. Mission industrielle et commerciale en Afrique Occidentale Française, 154*
- Schilling, Prof. Dr. Viehzucht in den deutschen Kolonien, 227*
- Schlagintweit, Dr. O. Eine Bergfahrt im nördlichen Peru, 715*
- Schleswig-Holstein, Map: Die Muttersprache der Bevölkerung in den einzelnen Kreisen der Provinz Schleswig-Holstein, 878*
- Schlobach, Maj. A. D. Mit Lindequist durch Ostafrika, 68*
- Schlütter, Dr. O. Beiträge zur Bevölkerung- und Siedelungsgeographie Deutschlands, 227*
- Schmidt, Dr. E. Aus dem italienischen Marken, 398*
- Schmidt, Dr. M. G. Deutsche Kolonialschule in Wittenhausen, 952*; see also A. Steinhauß, *joint author*.
- Schmidt, P. W. Grundlinien einer Vergleichung der Religionen und Mythologien der austronesischen Völker, 72*; Die Stellung der Pygmäenvölker in der Entwicklungsgeschichte des Menschen, 479*
- Schmied, A., and Arnold. Carte de la région des marais du Rio Pilcomayo et du Rio Confuso, 67*
- Schmittthener, H. Lop-Nor-Problem und seine Lösung, 156*
- Schnitzler, J.-H. Russie, Pologne et Finlande. Tableau statistique, etc., 239*
- Schnoekel, Oberleut. Besuch des Vulkans auf der Samoa-Insel Sawaii, 792*
- Schoen, Prof. —. Alte Sitten in der Bretagne, 315*
- Schofield, S. J. Reconnaissance in East Kootenay, 949*
- Schokalsky, Gen. J. de. Recueil des nivellements des chemins de fer de la Russie comme base des travaux hypsométriques, 71*; De l'utilité d'une association cartographique internationale, 73*; Variations périodiques des glaciers, 1909. Russie, 559*
- Scholefield, G. H. Origins of the New Zealand Nation, 718*
- Schomburgk, H. Wild und Wilde im Herzen Afrikas, n., 926
- Schönebeck, A. Kiachta, 224*
- Schonken, F. T. Wurzeln der Kapholändischen Volksüberlieferungen, 72*
- School Geography. See under Geography.
- Schott, Dr. G. Bedeutung einer internationalen Erforschung des Atlantischen Ozeans in physikalischer und biologischer Hinsicht, 74*; Neuere ozeanographische Arbeiten der Deutschen Marine, usw., 74*; Physische Meereskunde, n., 387
- Schrader, Fr., *joint author*, see V. de Saint-Martin.
- Schrader, Dr. O. Indogermanen, *rev.*, 943
- Schuler. Élevage de l'autruche à Madagascar, 155*
- Schultz, A. R. Southern Part of Rock Springs Coal Field, Wyo., 151*; Weathering of Coal in Arid Region of Green River Basin, Wyo., 151*
- Schultze, Dr. E. Streifzüge durch das nordamerikanische Wirtschaftsleben, *rev.*, 531
- Schultze, R. Karte des besiedelten Gebietes der Landschaft Turu, n., 797
- Schulze, Dr. F. Polarforschung im geographischen Unterricht, 228*
- Schulze, L. F. M. Führer auf Java, 400*
- Schumacher, Dr. G. Karte des Ostjordanlandes, 709*
- Schuster, Dr. A. N. Eine Reise über die Anden, 868*
- Schütze, H. Zur Verbreitung und Entstehung der Posener Seen, 639*
- Schuylkill R., Philadelphia Water Front, Chart U. S. Coast and Geod. Surv., 631*
- Schwender, J. Der Steigerwald: ein Beitrag zur Geographie Frankens, 679
- Science Bulletin, Kansas Univ., 152*
- Science Teaching, Broad Lines in. Edited by F. Hodson, *rev.*, 464
- Scotland: ¶ Bathymetrical Survey of Scottish Freshwater Lochs, conducted under direction of Sir John Murray and L. Pullar. Report on Scientific Results, 320*; *rev.*, 933; Caledonia; or, Historical and Topographical Account of North Britain from most ancient to the present Time, etc. G. Chalmers, 320*; Celtic Scotland: History of Ancient Alban. W. F. Skene,

- 320* **¶** Map of Scotland: Density of Population of, 879*
- Scott, Capt. R. F., sails for the Antarctic, 57
- Seals: **¶** Fur Seals of Bering Sea, 286; — and Fur-Seal Islands of the North Pacific Ocean. D. S. Jordan *et al.*, 239*; Illustrations showing Condition of — Rookeries in 1895 and Method of Killing Seals. C. H. Townsend, 240*; Fur Seal Treaty signed at Washington, 622
- Seaman, L. L. Wonders of Mosi-Oatunga: The Falls of the Zambesi, 951*
- Sea Power, Influence of — upon History. 1660-1783. A. T. Mahan, 239*
- Sechuan: **¶** Mongolia-Se-chuan Exp. of the Imp. Russian Geog. Soc. P. K. Kozlov, 396*; Reise durch die Eingeborenstaaten in Westszechuan. Weiss, 224*; Spedizione nella Mongolia e nel Secuan. P. Kozlov, 951*
- ¶** Map of Se-chuan and Tibet: Itinéraire au Tibet oriental. J. Bacot, *n.*, 550
- Sederholm, Dr. J. J. Sur la géomorphologie de la Finlande, 71*
- Seelheim, Dr. H. Filchner'sche Vorexpedition nach Spitzbergen, 479*; Geol.-morphol. Übersichtskarte der Ueckermünder Heide, 710*; Spitzbergen-Vorexpedition der Filchner'schen Deutschen Antarktischen Expedition, 228*
- Seffer, Dr. P. O. Agricultural Possibilities in Tropical Mexico, 395*
- Seiches in some Lakes of Japan. S. Nakamura and K. Honda, 717*
- Seidlitz, W. von. Lappland. Erinnerungen an den intern. Geologenkongress, 793*
- Seine: **¶** Fenomeni idrologici e climatologici nel bacino della Senna. Dr. G. Pullé, 559*; Sur la crue de la — Janvier 1910. L. Gallois, 718*
- Seiner, F. Verbindungsweg zwischen Deutsch-Südwestafrika und der Betschuanenland Eisenbahn, 154*
- Seismology. See also Earthquakes: **¶** Association Internationale de Sismologie. Dr. F. A. Forel, 73*; Seismische Verhalten des Atlantischen und Pazifischen Ozeans. Dr. G. Gerland, 71*; Seismograph. O. Klotz, 399* **¶** Map: Seismische Karte von Schweden . . . 1910. Dr. R. Kjellén, 80*
- Seligmann, C. G., and B. Z. The Veddas, *rev.*, 930; Map, 956*
- Selkirk Range adjacent to Mount Sir Sandford, Map Part of. H. Palmer, 230*
- Selrain, Gletscherbeobachtungen in — und nördlichen Stubai 1909. Dr. M. Lagally, 477*
- Semenov, B. P. Town and Village in European Russia. Sketch of Economic Geography [In Russian], 316*; Review in French, 719, Map, 311
- Semon, R. In the Australian Bush and on the Coast of Coral Sea, etc., 237*
- Simple, E. C. Influences of Geographic Environment on the Basis of Ratzel's System of Anthropogeography, *rev.*, 937
- Senegal: **¶** Confréries musulmanes et le Maraboutisme dans les pays de Sénégal et du Niger. M. Delafosse, 716*; Statistiques du Commerce . . . 1908, 556*; Travaux de délimitation de frontière anglo-française au nord et au sud de la Gambie. A. B. B. Tschanner, 69*
- Seoul, Cook's Handbook for Tourists to . . . and Seoul, *n.*, 376
- Sephton, J. (*Translator*). The Saga of King Sverri of Norway, 239*
- Servia: **¶** Émancipation économique de la Serbie. G. Gravier, 952*; A travers la Serbie. P. Labbé, 793*
- Sevilla, R. V. y. Republica Oriental del Uruguay en 1910, 790*
- Seward Peninsula: **¶** Geology and Mineral Resources of Solomon and Casadepaga Quadr. P. S. Smith, 474*; Geol. Reconnaissance in S. E. — and Norton Bay-Nulato Region. P. S. Smith and H. M. Eakin, 867*; Mining in. F. F. Henshaw, 474*
- ¶** Maps of Seward Peninsula: Geol. Map of Southeastern, *n.*, 630; Reconnaissance Map of Southwestern —, 629*
- Shackleton, Sir Ernest. His Contribution to Biogeography. C. H. T. Townsend, 479*; Proposed Expedition to Wilkes Land, 58; Shackletons Südpolarexpedition und ihre Ergebnisse. O. Baschin, 227*
- Shaler, M. K., *joint author*, see S. H. Ball.
- Shaler, N. S. American Highways, 400*
- Shanghai: Le port de Changhai. Fauvel, 156*
- Shan States: Shans at Home. Mrs. L. Milne, *rev.*, 864
- Shantung, Die Pest in Ost-. P. M. Gäng, 792*
- Shasta Myths. R. B. Dixon, 394*
- Shaw, E. W. Geol. Map of Foxburg

- Quad., Pa., showing Structure and Coal Outcrops, 874*; High Terraces and Abandoned Valleys in Western Pennsylvania, 714*; How to increase the Yield of Wheat in California, 714*
- Sherman, S. A. Lumber Rafting on Wisconsin R., 714*
- Shiites: The Glory of the Shia World. Transl. and Edited from Persian MM. by Maj. P. M. Sykes, *rev.*, 784
- Shilka, Steamship Service on Amur and — Rivers, 621
- Shimer, H. W. Lake Minnewanka Section, 949*
- Shirase, Lieut., leader of the Japanese Antarctic Expedition, 291
- Siam: ¶ Chemins de fer du, 792*; Chemin de fer de Bangkok à la Malaisie Britannique, 156*; Reisbau in. Dr. C. C. Hosseus, 870*; A travers le. E. de La Jonquière, 477*; True Description of the Mighty Kingdoms of Japan and —. Written Originally in Dutch by F. Caron and Joost Schorten, etc. (1671). R. Manley, 237*
- Siberia: ¶ Zur Geschichte der Bekanntschaft mit Sibirien vor Jermak. H. Michow, 224*; *Niekotorye danniya k dolednikovoi flory sieviera Sibiri* [Data on the preglacial Flora of northern —]. V. N. Sukachev, 792*; Le progrès du Transsibérien. P. Labbé, 224*; Siberia as It Is. H. De Windt, 236*; Overland Route from Peking to Petersburg. A. Michie, 237*; Record of Travel, Climbing and Exploration. S. Turner, *n.*, 930; Strange — Along the Trans-Siberian R.R. M. L. Taft, *n.*, 698; Tent Life in. G. Kennan, *n.*, 209; Travels in Kamtchatka and Siberia with Narrative of a Residence in China. P. Dobel, 236*; *Ziemledielcheskaia Sibir* [Statistics of Agric. population], 557* ¶ Maps of Siberia: Charts of the Chief Hydrographic Office, 2 Charts showing Siberian Coasts, 799*; Fundorte von Mammut- und Nashorn-Resten in Sibirien, *n.*, 70
- Sibiriakoff, A. Über die Fahrten der Novgoroder durchs karische Meer und . . . Halbinsel Jalmal zum Ob, 70*
- Sicily and Southern Italy, Lecture on. Prof. A. S. Riggs, 281
- Siebert, A. Erdbebentätigkeit in Deutsch-Neuguinea, 226*
- Sievert, Dr. L., to explore Libyan Waste in an Airship, 288
- Sierra Leone: ¶ Bibliography of. *n.* H. C. Lukach, 781; Palm Kernel and Oil Industry, 69*; — and Its Commercial Expansion. T. J. Alldridge, 717*; Sierra Leone [from Trade Report for 1909], 69* ¶ Map of Sierra Leone, 877*
- Sierra Nevada, Geomorphogeny of — Northeast of Lake Tahoe. J. A. Reid, 553*
- Sievers, Dr. W. Source of the Amazon, 197
- Sikkim, Notes on Certain Glaciers in. T. H. D. LaTouche, 225*
- Silva Nüño de, Summary of confession . . . 1597. Summary of the Voyage of the *Corsair*. Report on Part of Sir Francis Drake's Famous Voyage by his prisoner — to the Tribunal of Inquisition of Mexico. Transl. by Z. Nuttall, 873*
- Simcoe District, Ont. W. A. Johnston, 949*
- Similkameen and Tulameen Districts, B. C., Parts of. C. Camell, 948*
- Simler (Josias). De Helvetiorum Republica, etc., 1577, 239*
- Simon, W. Gran-Chako und die Pampas, 67*
- Simons, F. A. A. Peninsula de la Guagira (Map), 955*
- Simplon, Lettres sur la Route de Genève à Milan par le — écrites en 1809. 10^{me} éd. G. Mallet, 238*; Simplon et l'Italie Septentrionale. Promenades et Pèlerinages. J.-L. Belin, 237*
- Simplon, Le Tunnel du. Ed. Barneaud, 316*
- Sinai: Sites délaissés d'Orient: du Sinai à Jerusalem. Comte J. de Ker-gorlay, 225*
- Sion, J. Le Var supérieur. Étude de Géographie physique, *rev.*, 464
- Siriono-Indianer in Ostbolivien. E. v. Nordenskiöld, 395*
- Sitka, Alaska, Results of Observations made at Coast and Geod. Surv. Observatory at —, 1907-8. D. L. Hazard, 867*
- Siuslaw R., Chart U. S. Coast and Geod. Surv., 158*
- Siwa: ¶ Siwah. Oasé des Sonnengottes in der libyschen Wüste. J. C. E. Falls, *rev.*, 628
- Skeena R. District. W. W. Leach, 949*
- Skene, W. F. Celtic Scotland: History of Ancient Alban, 320*
- Skottsberg, C. Einige Beobachtungen über die Eingeborenen Westpatagoniens, 153*
- Sladen, D. Carthage and Tunis, old and new gates of the Orient, 319*

- Sleeping Sickness: ¶ *Geographische Verbreitung der Schlafkrankheit*. Dr. G. Meyer, 318*; *Maladie du Sommeil*. Dr. G. Dreypondt, 228*; *Rapport sur le fonctionnement du laboratoire de Brazzaville depuis 1906*. Heckenroth, 791*; *Sleeping Sickness*, 136; — In Uganda. P. Mac Queen, 181
- Slocan District, B. C. O. E. Leroy, 949*
- Slosse, E. Du Lualaba au Moero, 950*
- Smith, A. L. A Nation in the Making [Union of South Africa], 791*
- Smith, C. D. Fort Peck Indian Reservation Lignite Field, Mont., 221*; Washburn and Fort Berthold Lignite Fields, N. D., 222*
- Smith, H. I., to Conduct Archaeological Survey of Canada, 861
- Smith, J. R. Economic Importance of the Plateaus in Tropic America, 36
- Smith, A. L. An Australian Meteorite, 156*
- Smith, P. S. Geology and Mineral Resources of Solomon and Casadepaga Quadr., Seward Peninsula, 474*; — and H. M. Eakin. *Geologic Reconnaissance in S. E. Seward Peninsula and Norton Bay-Nulato Region*, 867*; *Mineral Resources of Nulato-Council Region [Alaska]*, 151*
- Smith, S. P. Easter Island (Rapa-Nui) and Rapa (Rapa-Iti) Island, 397*
- Smith, W. D. Essential Features of Geology of Philippine Islands, 557*
- Smyrna: *Le port de Smyrne*, 70*
- Smyth, C. H., Jr., *joint author*, see H. P. Cushing.
- Snape, H. J. Europe. *Blackie's Causal Geographies Regionally Treated*, n., 866
- Snellen, M., and H. Exama. *Rapport sur l'expédition polaire néerlandaise qui a hiverné dans la mer de Kara en 1882-83*, *rev.*, 146
- Snow. See also Nieve Penitente: *Allerlei Beobachtungen über Schnee und Zackenfirn (Büsserschnee)*. F. Jaeger, 479*
- Snow Mountains of New Guinea, Expedition to. H. A. Lorentz, 718*, 952*
- Snowden, R. History of North and South America, 216*
- Society Islands: ¶ *Trois Archipels de la Polynésie orientale*. Samoa; Îles sous le Vent; Marquises. R. La Bruyère, 638*
- Socotra, Map: *Geol. Karte von Sokótro*, n., 877
- Soil, Fertility of the. A. D. Hall, 72*
- Soissons, Count de. *Hungarian Self-Taught*. Thimm's System, n., 149
- Sokratova, T. *Novaya Ziemla*, 479*
- Sölch, Dr. J. *Studien über Gebirgspässe mit besonderer Berücksichtigung der Ostalpen*, 602
- Soley, Lieut. J. C. Map of the Gulf Stream in the Gulf of Mexico showing Currents as they exist during Different Seasons (reverse Pilot Chart of North Atlantic Ocean), 632*
- Solger, Dr. F. *Studien über Nordost-deutsche Inlanddünen*, n., 144
- Solomon Islands: ¶ *Buka*. Nach Aufnahmen von Dr. G. Friederici u. Bergingenieur Schön sowie eigenen Beobachtungen von Prof. Dr. K. Sapper, 226*; *Durchquerung von Bougainville*. K. Sapper, 226*
- Somali Coast, French Protectorate: *Statistique du Commerce . . . 1908*, 556* ¶ *Map: Carte de la Côte Française des Somalis et Régions avoisinantes*. A. Meunier, n., 797
- Somaliland, Italian: ¶ *Chemin de fer dans la Somalie italienne*. E. de Renty, 716*; *Il Basso Giuba italiano e le concessioni agricole nella Goscia*. Capt. G. Ferrari, 69*
- Soriano, Dr. M. S. San José de Costa Rica, 554*
- Sorre, M. Groupement des populations dans la Catalogne septentrionale, 639*
- South Africa. See under Africa.
- South America. See under America.
- South Australia. See under Australia.
- South Carolina: ¶ *Results of Spirit Levelling in . . . 1896-1909*. R. B. Marshall, 313* ¶ *Maps of South Carolina: Anderson Co.*, 77*; *Map to Show Distribution of Granites and Granite Quarries*, 76*; *Map showing production of cotton in 1909*, 229*; *Soil Survey map of Conway area*, 158*
- South Dakota: ¶ *Badlands of the Black Hills*. C. C. O'Harra, 52; *Results of Spirit Leveling, 1896 to 1910*. R. B. Marshall, 948* ¶ *Map of Black Hills region*. C. C. O'Harra, n., 77*; *Sketch Map of Missouri Coteau and its Moraines*. J. E. Todd, 955*
- South Georgia: *Grytriken [Whaling Station in]*, 872*
- South Island, N. Z., *Map showing Land Transactions 1909-10*, 232*
- South Orkney Islands, Argentine Meteorological Station in. C. L. Chandler, 152*
- South Park, Col., *Coal Field*. C. W. Washburne, 152*
- South Sea Islands. See also Islands of the Pacific Ocean: ¶ *Ergebnisse der*

- Regenmessungen im Jahre 1909, 557*;
Possessions allemandes dans la mer du Sud. L. Nemry, 557*;
Rechtsleben der Eingeborenen der deutschen Südseeinseln, usw. Dr. R. Thurnwald, 397*;
Savage South Seas. N. H. Hardy and E. W. Elkington, 400*;
Through Tropic Seas. F. Burnett, n., 380
Southworth, T. Settlement of Northern Ontario, 66*
Sowerby, J. Forest Cantons of Switzerland, 239*
Sowetow, S. Der Aral-See, 155*
Spain: ¶Description de las costas y puertos de España de Pedro Teixeira Albernás. A. Blázquez, 227*;
Über Grundlagen der Landeskunde von Spanien. A. Rühl, 227*;
Population of, 621; The Spaniard at Home. M. F. Nixon-Roulet, *rev.*, 383
¶Map of Spain: Goode's Base Map, n., 712
Spanish Dependencies, Inquisition in the. H. C. Lea, n., 947
Sparks, E. E. Report of Conference on the Relations of Geography to History, 317*
Spegazzini, C. Notes . . . Agricultural and Pastoral Flora of Argentina, 314*
Speight, R. Petrological Notes on Rocks from Kermadec Islands . . . some Geol. Evidence for Existence of Subtropical Pacific Continent, 70*
Speiser, Dr. F. Ethnological Investigations in New Hebrides, 857
Speleology. See also Caves: Recherches spéléologiques dans le Département du Gard, 1904-9. F. Mazauric, 315*
Spencer, J. W. L'évolution des chutes du Niagara, 66*;
Relationship of Niagara River to Glacial Period, 151*;
Relative Work of the Two Falls of Niagara, 714*
Spethmann, Dr. H. Grundzüge der Oberflächengestaltung Cornwalls, 851;
Lübeck. Eine landeskundlicher Grundriss, 315*
Spezia, Map, n., 311
Spillimacheen Mts., Canada, Expedition to — Photo-Topographical Surveys. A. O. Wheeler, 868*
Spinner, H. Évolution de la Flore neuchâteloise, 478*
Spitzbergen: ¶Binneneiswanderungen in. H. Wichmann, 398*;
British Work in —: Some Historical Notes. R. N. R. Brown, 639*;
Découverte de gisements de glace fossile à la Nouvelle-Zemble et au Spitzberg. C. Rabot, 479*;
Exkursion des XI. Intern. Geol.-Kongresses nach. Dr. F. Wahnschaffe, 479*;
— Excursion of the International Geological Congress, 31;
Eisverhältnisse an den Küsten Spitzbergens sowie im Ost- und Westeise 1910. G. Isachsen, 719*;
Filchnerische Vorexpedition nach. Dr. H. Seelheim, 479*;
Spitzbergen-Vorexpedition der Filchnerischen Deutschen Antarktischen Expedition. Dr. H. Seelheim, 228*;
Hydrographische Beobachtungen der schwedischen Expedition nach, 1908. A. C. Reichard, 872*;
Norwegian Expeditions, 859; Rittmeister Gunnar Isachsens Norwegische Spitzbergen Expedition, 1909-10, 479*;
Ressources économiques. J. Denucé, 398*;
Zeppelin Study Expedition. Prof. E. v. Drygalski, 198;
Zeppelin-Studienfahrt nach Spitzbergen und ins nördliche Eismeer, 1910. Dr. E. v. Drygalski, 398*
Sprigade, P., und M. Moisel. Deutsch-Südwestafrika (map), 231*;
Fortschritte der deutschen Kolonial-Kartographie in den Jahren 1905-10, 316*;
Die wichtigsten Nordpolarreisen des XIX und XX Jahrhunderts . . . besonderer Berücksichtigung . . . Erreichung des Pols war (Map), n., 234
Stabler, H. Some Stream Waters of Western United States, 948*
Stair, Earl of, Personal, 60
Standley, P. C. The Type Localities of Plants first described from New Mexico, 394*
Stanley Pool, Navigation sur le Congo et le —. C. Martin, 716*
Stappenbeck, Dr. R. Vorkordillere zwischen . . . Mendoza u. Jachal in Argentinien, 950*, Map, 707
Stars, Place Determination: Theorie der astrographischen Ortsbestimmung. L. de Ball, 72*
Statesman's Year Book, 1911. Ed. J. S. Keltie, 640*
Stauffer, C. R. Devonian of South-western Ontario, 949*
Stavenhagen, W. Über Stranddünen und ihre Befestigung, 872*
Stead, D. G. Brief Review of the Fisheries of South Wales, 477*
Stearns, M. R. Bibliography of Scientific Writings of R. E. C. Stearns, 789*
Stearns, R. E. C., Bibliography of Writings of —. M. R. Stearns, 789*
Stebinger, E., *joint author*, :c: M. W. Ball.
Stefánsson, V., — and Anderson in the Canadian Arctic, 771; More News from, 920
Steigerwald: Ein Beitrag zur Geographie Frankens. J. Schwender, 679
Stein, Dr. M. A. Maps from Chinese

- Turkestan and W. Kansu, 450; Maps illustrating his explorations in Central Asia, 392*
- Steiner, B. C. Maryland under Commonwealth, 867*
- Steiner, P. Kamerun als Kolonie und Missionsfeld, *n.*, 697
- Steinhauff, A., und Dr. M. G. Schmidt. Lehrbuch der Erdkunde für höhere Schulen, *n.*, 219
- Steinmann, Prof. Sketch-map of four great "Rock-groups" of the Alps. After —, 798*
- Stephens, G. Old Northern Runic Monuments of Scandinavia and England, now first Collected and Deciphered by — Many Hundreds of Facsimiles, etc., 320*
- Steppes, Les — de l'Ancien Monde. E. Lager, 792*
- Stevenson, Dr. E. L. *Editor.* Atlas of Portolan Charts, 530
- Stevenson, J. J. Coal Basin of Decazeville, France, 793*; Formation of Coal Beds, 640*; Sea Weed in the Sargasso Sea, 691
- Stieler's Atlas of Modern Geography, English Adaptation. B. V. Darbshire, *n.*, 235
- Stigand, I. A. Some Contributions to Physiography and Hydrography of North-East Borneo, 224*
- Stockholm, Geological Congress at, 227*
- Stok, Dr. J. P. van der. Elementare Theorie der Gezeiten; nebst den Gezeitenkonstanten der wichtigsten Orte des Indischen Archipels und anderer Hafenplätze, 953*; Map 798*
- Stoll, H., Voyage de — à travers l'Islande, 793*
- Stone, A. H. Studies in American Race Problem, *rev.*, 298
- Stone, Lieut. R. Skeleton or Plotting Charts, 635*
- Stone, R. W., and C. T. Lupton. Powder River Coal Field, Wyo., 151*
- Storm van's Gravesande [Laurens]. The Rise of British Guiana compiled from his despatches by C. A. Harris and J. A. J. de Villiers, 318*
- Stout, A. B. Prehistoric Earthworks in Wisconsin, 222*
- Stowell, W. H., and D. Wilson. History of the Puritans in England, and the Pilgrim Fathers, 239*
- Strauch, General, *Obituary*, 861
- Strauss' Reiserouten im westlichen Persien (Map), 310*
- Streeter, E. S., *Compiler.* Stranger's Guide, or, the Daguerreotype of Washington, D. C., 560*
- Stromboli. Dr. G. Platania, 71*
- Strub, W. Temperaturverhältnisse von Basel, 227*
- Struck, B. Zur Geologie von Kamerun, 870*; Skizze der Hamitischen Sprachgebiete in Aequatorial-Ostafrika (Map), *n.*, 548
- Strümpell, K. Bericht über eine Reise des Ostgrenzgebietes der Residentur Adamaoua, 555*; — explores Benue R., 288
- Stuart, M. Geology and Prospects of Oil in Western Prome and Kama, Lower Burma, 556*
- Stubai. ¶ Alpeiner Ferner in Stubai 1909. Dr. M. Lagally, 477*; Gletscherbeobachtungen in Selrain und nördlichen —. Dr. M. Lagally, 477*
- Stummer, Dr. E. Karte der Ankogel-Hochalmspitzgruppe, 233*; Niederschlag, Abfluss und Verdunstung im Marchgebiete, 397*; Talstudien im Gebiete des Ankogel und der Hochalmspitze, 477*
- Stuntz, S. C., and E. E. Free. Bibliography of Eolian Geology, 953*
- Stutzer, G. Das Flussgebiet der Ribeira de Iguaue im Süden des Staates S. Paulo, *rev.*, 695
- Styria: Styrian, Carnac and Julian Alps. J. Ball, 237* ¶ Map: Schutzwandkarte des Herzogtums Steiermark. Joh. G. Rothaug und H. Trunk, *n.*, 311
- Sudan: ¶ Colonisation au Soudan est-elle possible? P. C. Tappi, 153*; From Hausaland to Egypt through the. H. K. W. Kumm, *rev.*, 535; Oberflächengestaltung und Hydrographie des saharisch-sudanischen abflusslosen Gebietes. H. Marquardsen, 556*
- Anglo-Egyptian Sudan: ¶ Anglo-Aegyptischer Sudan. G. K. Rein, 153*; Les Dinkas. Col. Largeau, 790*; Englische Bewässerungsanlagen in Aegypten und im Sudan mit besonderer Berücksichtigung des Assuan-Staudammes, usw. G. R. Rein, 395*; Extending the Railroad, 54; Khont-Hon-Nofer. The Lands of Ethiopia. H. K. W. Kumm, *rev.*, 925; Some Red Sea Ports in. I. W. Crowfoot, 716*; Situation actuelle du Soudan égyptien, 950*; Sudan To-day and To-Morrow. H. L. Bridgman, 716*; Wirtschaftliche Verhältnisse in Ägypten und den ägyptischen Sudan. M. Schanz, 950* ¶ Map of Anglo-Egyptian Sudan: Égypte et Soudan Égyptien. Atlas Univ. de Géog. V. de Saint-Martin et Fr. Schrader, *n.*, 312
- French Sudan, Maps: Mission Tilho.

- Lac Tchad, Bahr el Ghazal, Bodeli et Borkou, *n.*, 231; Schéma du Massalit et itinéraires de la Compagnie Arnaut, 956*
- Suess, E. The Face of the Earth (Translation), Vol. IV, *rev.*, 540; Synthesis of Paleogeography of North America, 635*; Personal, 861
- Suez Canal, Commercial Movement in 1910, 198
- Suez, Gulf of. Petroleum near the, 527
- Sugar, Story of. G. T. Surface, *rev.*, 148
- Sukachev, V. N. Some Data on preglacial Flora of northern Siberia [in Russian], 792*
- Sulu Archipelago, Chart U. S. Coast and Geod. Surv., 545*
- Sulu Island, Map, 472*
- Sumatra: ¶ Absence of Religious Conceptions among the Kubus of. Prof. W. Volz, 686; Gunung Si-Bajak. A. Grubauer, 638*; Nord-Sumatra. Bericht über eine im Auftrage der Humboldt-Stiftung der Königlich Preuss. Akad. der Wiss. zu Berlin . . . 1904-06 ausgeführte Forschungsreise. Prof. Dr. W. Volz. Band 1. Batakländer, *rev.*, 377; Problème de la main-d'œuvre à —, 70* ¶ Maps of Sumatra: Das südliche Sumatra mit dem Wohngebiet der Kubus im zentralen Urwald, 709*; Kaart der Tabaksondernemingen ter Oostkust van. Tevens angevende de Koffeondernemingen. P. de Vries & Zoon, *n.*, 232; Het Ranau-Meer (Zuid Sumatra), 160*
- Sunda Islands. See also Malay Archipelago: ¶ Bericht über die von Dr. Elbert geführte Sundaexpedition des Frankfurter Vereins für Geog. u. Stat. Dr. B. Hagen, 224*
- Superior, Lake, Canoe Routes from — Westward. L. J. Burpee, 394* ¶ Map: Magnetic Variations over Lake Superior for 1910, 229*
- Superior, Lake Region, Progressive Development in the. L. Martin, 561, 659 ¶ Map to show Distribution of Iron Ores of — in 1909, *n.*, 76
- Supf, K. Deutsch-Koloniale Baumwoll-Unternehmungen, 398*, 871*
- Surface, G. T. Rice in the United States, 500; The Story of Sugar, *rev.*, 148
- Surinam: See Guiana, Dutch.
- Sutlej: Sources principales du Brahmapoutre et du Sutledje. A. H. Savage Landor, 225*
- Sutton, C. W. Irrigation of the Coast of Peru, 715*; Peru To-Day. Geographical Sketch, 636*
- Sutton, J. R. Some Observations of Dew at Kimberley, 55
- Sverri of Norway, The Saga of King —. Translated by J. Septon, 239*
- Swanton, J. R. Indian Tribes of the Lower Mississippi Valley and Adjacent Coast of the Gulf of Mexico, 633*, Map, 789*; see also C. Thomas, *joint author*.
- Swaziland, Agricultural Conditions in. R. T. Coryndon, 555*; Fruit Culture in. R. A. Davis, 717*
- Sweden: ¶ Some Facts on Forestry Conditions in. M. H. Foerster, 719*; Forest Conservation Law. B. E. Fernow, 719*; Journey through Sweden . . . with particulars . . . History of Denmark, etc. Written in French by a Dutch Officer, translated by W. Radcliffe, 1790, 239*; Recul du pin sylvestre dans les montagnes de Suède. C. Rabot, 719*; Die schwedischen Erdbeben. R. Kjellén, 398*; Svenska-Turist-Föreningens Årsskrift 1911, 952*; Variations périodiques des glaciers, 1909. Suède. Dr. A. Hamberg, 559* ¶ Maps of Sweden: Geol. Map of Pre-Quaternary Systems of. A. E. Törnebohm, 711*; Karte öfver Mellersta Sveriges Landformer. (Geol. Survey.) Sten de Geer, *n.*, 711*; Seismische Karte von Schweden . . . 1910. Dr. R. Kjellén, 80*; Spätglaciale Süd-Schweden. Übersichtskarte mit Osen, Endmoränen und Schrammen. G. de Geer, *n.*, 711
- Switzerland: ¶ Dérivations glaciaires de cours d'eau dans la Suisse occidentale et le Jura français. Prof. H. Schardt, 71*; Einbruch des Lötschbergtunnels unter dem Gasterntal. Dr. J. Früh, 71*; Étude sur l'anthropologie de la Suisse. Dr. A. Schenk, 478*; Forest Cantons of. J. Sowerby, 239*; De Helvetiorum Republica, etc. (Josias) Simler, 1577, 239*; Histoire naturelle des Glaciers de Suisse. (G. S.) Grouner, traduction de l'allemand . . . par M. de Kéralto (1770), 238*; Itinéraire du Mont-Righi et du Lac des 4 Cantons . . . description de Lucerne. [J.] Businger, 238*; Jahrbuch des Schweizer Alpenclub, 1910-11, 880*; Klima der Schweiz. Dr. H. Bach, 316*; Orthographie des noms de lieu de la Suisse Romande. E. Muret, 478*; Picturesque Tour through France, Switzerland, etc., in 1816. [Joseph Mawman], 238*; Population of — 1910, 370; Rôle des conditions

- topographiques dans le développement des villes suisses. P. Girardin, 871*; Schweizer Schul-Kartographie. Dr. R. Hotz-Linder, 871*; Stand der schweizerischen Binnen-Schiffahrtsfrage. Dr. A. Hautle-Hättenschwiler, 478*; Swiss Mountain Climbs. G. D. Abraham, *n.*, 701; Swiss Pictures drawn with Pen and Pencil. S. Manning, 238*; Travels from Berlin, through — to Paris in 1804. A. v. Kotzebue, 238*; Voyage pittoresque en Suisse, etc. J. Cambry, 238*; Voyage pittoresque en Suisse, en Savoie et sur les Alpes. E. Bégin, 237*
 ¶ Maps of Switzerland: Atlas to Ebel's Traveller's Guide through... also Vocabulary in Swiss Dialect, French and English, 239*; Maps accompanying "Coudes de Capture" du pays fribourgeois, 959*; Maps illustrating "Les Cirques de Montagne." M. Koncza, 959*; Têtes de ravins du Rio du Petit Rome et du Lavapesson, 959*; Trois "boucles" de la Sarine. C. Calciati, 959*
 Sykes, E. C. Persia and Its People, *n.*, 544
 Sylvester, A. H., *joint author*, see R. B. Marshall.
 Szent (St.) Anna See. Isohypsenkarte der Umgebung des, Isobathenkarte des, 957*
 T.
 Taal Volcano, Eruption of. Abridged from paper by W. E. Pratt, 903
 Taché, A. M. Cartes Régionales de la Province de Québec, 633*
 Taff, J. A., and W. J. Reed. Madill Oil Pool, Oklahoma, 151*
 Taflelt, Le. D'après René Caillié, 716*
 Tafrata, Région de — et les tribus qui l'habitent. Lieut. Lefèvre and Nehlil, 69*
 Taft, M. L. Strange Siberia Along the Trans-Siberian Railway, *n.*, 698
 Tahiti: ¶ Eastern Pacific Lands: Tahiti and Marquesas Islands. F. W. Christian, *rev.*, 380; Otahiti. Au Pays de l'éternel Été. H. Lebeau, *rev.*, 379
 Taillis, J. du. Mogador, le dernier Port ouvert du Maroc sur l'Atlantique, 790*
 Talbot, H. W. B. Geol. Observations in the country between Wiluna, Hall's Creek, and Tanami, 477*
 Talbot, P. A. Land of Ekoï, Southern Nigeria, 155*; MacLeod Falls on the Mao Kabi, French Equatorial Africa, 637*; Oban District (Map), 79
 Talman, C. F. Brief List of Meteorological Text-Books and Reference Books, *n.*, 220
 Tamalpais, Ascension de. E. Deschamps, 553*
 Tanana, Yukon — Region, Water Supply, 1909. C. E. Ellsworth, 635*
 Tancredi, A. M. Nel Piano del Sale, 639*; Aridity, Salt Deposits and Currency (a Review of above), 692
 Tanfilief, Prof. G.-J. Über den Einfluss niedriger Bodentemperatur auf die Vegetation in Russland, 72*
 Tanga, Zur Geologie und Hydrologie von Daressalam und —. W. Koert and F. Tornau, *n.*, 927
 Tappi, P. C. Une Colonisation au Soudan est-elle possible?, 153*
 Tarawera Eruption and After. Prof. J.-Park, 638*
 Tarr, Prof. R. S. Glacial Advance in Alaska and Earthquakes, 285; man and His Environment in Germany, 227*; Spitzbergen Excursion of the Intern. Geol. Congress, 31; Theory of Advance of Glaciers in Response to Earthquake shaking, 399*
 Tasmania: ¶ Antiquity of Man in. F. Noetling, 871*; Food of Aborigines. F. Noetling, 871*; Geology of. The Pre-Cambrian. L. K. Ward, 226*; Minerals of. W. F. Petterd, 871*; Speech of Tasmanian Aborigines. H. B. Ritz, 226*
 Tassart, L. C. Exploitation du Pétrole, *rev.*, 147
 Tatáu, Nordwestspitze der Insel — (Map). Dr. K. Sapper, *n.*, 232
 Tatra Mts.: Zur Kenntnis der Seen der Hohen —. Prof. Dr. Halbfass, 477*
 ¶ Maps: Cirque de Gasiennicow Stawy, de Koscielisko et Sondage du Lac Czerwony Staw. M. Koncza, 958*
 Tavernier, Jean Baptiste. Leben und Reisen... Handelsgeographen, usw. R. Tronnier, 74*
 Taylor, B. *Editor*. Illustrated Library of Travel, Exploration and Adventure, 240*
 Taylor, E. W. Model Experiments on Suction of Vessels, Reverse of Pilot Chart of the North Atlantic Ocean, 545*
 Taylor, F. B. Bearing of the Tertiary Mountain Belt on the Origin of the Earth's Plan, 228*
 Taylor, G. Australia in its Physiographic and Economic Aspects, *n.*, 539

- Tea: Thé. Les Principaux Centres de Production, 719*
- Technical Appliances: Einfluss der Technik auf Verkehr und Siedlung. R. Tronnier, 952*
- Tehuantepec, Isthmus of — "Bridge of the World's Commerce." H. Olsson-Seffer, 152*; Zur jungtertiären Fauna von. E. Böse and F. Toulia, 314*
- Teillers, J. W. Ethnographica . . . Museum Bataviaasch Genootschap van Kunsten en Wetenschappen to Batavia, 72*
- Teisserenc de Bort, L., et A. L. Rotch. Étude de l'atmosphère marine par sondages aériens Atlantique moyen et région intertropicale, 560*
- Teixeira Albernaz, Pedro. Descripción de las costas y puertos de España de —. A. Blázquez, 227*
- Telegraphy: ¶ Destruction of Telegraph Lines by Giraffes in German East Africa, 289; Transatlantic Wireless Telegraphy. Comm. G. Marconi, 640* ¶ Map showing the World's Telegraphic System, 1911, 959*
- Telephone, History of. H. N. Casson, n., 308; Lightning Strokes and —. K. Langbeck, 920
- Témiscamingue, Colonisation du. L'abbé Iv. Caron, 152*
- Tempany, H. A. Agricultural Labour Conditions in Leeward Islands, 554*
- Temperatures: Zusammenhang zwischen Temperaturverhältnissen der Atmosphäre und dem Druck an Erdoberfläche. Prof. W. Trabert, 74*
- Tennessee: Results of Spirit Levelling . . . 1896-1909. R. B. Marshall, 313* ¶ Maps of Tennessee. Abingdon Quad., 629*; Ellijay Quad., 389*; Pikeville Special Quad., 75*; Map showing production of Cotton in 1909, 229*; Soil Survey, Sumner Co., 77*
- Terminology, Geomorphological: Terminologie der Oberflächenformen. A. Hettner, 640*
- Terre Haute, Ind., Physiographic Survey of an Area near. C. R. Dryer and M. K. Davis, 313*
- Terrestrial Magnetism: See Magnetism.
- Terrier, A. Chemin de fer de Konakry au Niger, 154*; Essor de l'Afrique Occidentale Française, 716*
- Tertiary Mountain Belt, Bearing of — on the Origin of Earth's Plan. F. B. Taylor, 228*
- Tetuan: La situation économique de Tétouan. Ch. René-Leclerc, 716*
- ¶ Map: Zone de 10 Kilomètres autour de Tétouan, 472*
- Texas: ¶ Beginnings of — 1684-1718. R. C. Clark, 474*; Great Arc of Primary Triangulation. W. Bowie, 447; Mineral Resources of Llano-Burnet Region, with an Account of Pre-Cambrian Geology. S. Paige, 948*; Tin Deposits of El Paso Co. R. Chauvenet, 553* ¶ Maps of Texas: Burnet and Linden Quadrangles, 75*; General Geol. Map showing location of Burnet and Llano Quadrangles, with principal quarries, mines, and prospects, n., 706; Econ. and Geol. Map of Llano Quad., n., 706; Geologic Map of Texas, n., 706; Geol. Map of Central Coastal Plain Region of — showing location of Clay Deposits, 1911, 875*; Map of Clay and Lignite Fields near Lena, 875*; Map showing production of cotton in 1909, 229*; San Marcos Quad., 389*; Soil Survey maps of Grayson Co., 158*; Morris Co., 77*; Titus Co., 229*
- Textiles, Géographie des. P. Clerget, 479*; Spinn- und Webwerkzeuge. M. von Kimakowicz-Winnicki, 72*
- Thackeray, L. People of Egypt, n., 303
- Theall, G. M. Yellow and Dark-Skinned People of Africa South of the Zambesi, *rev.*, 537
- Theiss, S. Map: Les environs du confluent du Danube et de la Tisza, 957*
- Thiery, C. de. An Anomalous Island, 557*
- Thomas, C., and J. R. Swanson. Indian Languages of Mexico and Central America and their Geographical Distribution, 868*; Linguistic Map of Mexico and Central America, 706
- Thompson, David, a Great Geographer. J. B. Tyrrell, 318*
- Thompson, M. S., *joint author*, see A. J. B. Wace.
- Thompson, S. H. Highlanders of the South, *rev.*, 295
- Thonner, F. R. Vom Kongo zum Ubangi, *rev.*, 64; Übersichtskarte, Sprachenkarte und Aufnahmen des Gebietes zwischen Kongo und Ubangi, n., 159
- Thoulet, J. Couleur des Fonds marins, 318*; — et Chevalier. Mesure des densités d'Eaux marine par Floteurs totalement immergés, 318*
- Thousand Islands Region: ¶ Geology of. H. P. Cushing, H. L. Fairchild, R. Ruedemann & C. H. Smyth, Jr., 222*; Place Names in. J. White, 222*
- ¶ Maps of Thousand Islands Region: Map to show geology of Clayton, Grindstone, Theresa and Alexandria

- Bay Quadrangles, *n.*, 158*; Map to show Hydrography of, *n.*, 158
- Thuringian Forest, Maps: Thüringerwald-Karten: Eisenach-West, Friedrichroda-Waltershausen, Ilmenau, 79*
- Thurnwald, Dr. R. Rechtsleben der Eingeborenen der deutschen Südseeinseln, *u.w.*, 397*
- Tian-Shan: ¶Carbon and Carbonfossilen des nördlichen und zentralen Tian-Schan. Wiss. Ergebnisse Merzbacherschen Exp. P. Gröber, *n.*, 66; Meine letzte Tian-Schan Expedition, 1907-8, Über Verlauf und Ergebnisse meiner neuen Forschungsreise in den. Dr. G. Merzbacher, 397*
- Tibbaud, Ém. Nos missionnaires au Congo, 68*
- Tibesti, La question du. R. de Caix, 717*
- Tibet: ¶Central Asia and Tibet. S. Hedin, 237*; The Cloud in Tibet. British Action and Its Results. Sir Francis Younghusband, 156*; The Country and Its Inhabitants. F. Grenard, 237*; Dalai-Lama or Tschilama? 70*; Histoire de la Mission du Thibet. A. Launay, *rev.*, 538; A travers le Tibet oriental. J. Bacot, 718* ¶Map of Tibet: Itinéraire au Tibet oriental par J. Bacot, *n.*, 550
- Tides: ¶Elementare Theorie der Gezeiten; nebst den Gezeitenkonstanten der wichtigsten Orte des Indischen Archipels und anderer Hafenplätze, Dr. J. P. van der Stok, 953*; Nautical Science . . . Together with a Study of Tides and Tidal Currents. C. S. Poor, *rev.*, 469 ¶Map: Linien gleicher Gezeitenphase im Ostindischen Archipel. J. P. van der Stok, 708
- Tierra del Fuego, Breve reseña geográfica y estadística de, 950*
- Tietze, Dr. E. Jahresbericht für 1910 [Austria-Hungary], 792*
- Tietze, O. Geologischen Verhältnisse der Umgegend von Breslau, 558*
- Tikal, Preliminary Study of Prehistoric Ruins of. A. M. Tozzer, 949*; Tikal. T. Maler, 949*
- Tilho, Capt. J. Documents scientifiques de la Mission Tilho (1906-09), *n.*, 303; French Mission to Lake Chad, 223*; Résultats scientifiques de la mission. Ch. Lallemand, 223*, Maps, 231*
- Timbuktu. ¶Tombouctou en 1909. F. Dubois, 396*; Les Touareg de la région de—. Capitaine Aymard, 223* ¶Map: Tombouctou, 797*
- Timor, Die Insel. Dr. E. Carthaus, 396*
- Tirashochfläche. Dr. Moritz, 396*
- Tirol: Brennerbuch. Naturansichten . . . aus Tirol. H. Noé, 238* ¶Map: G. Freytag's. Automobil- und Radfahrer-Karten. Südtirol und Oberitalien, 79*
- Tisdell, E. F. Guatemalan Railroad Construction, 395*; Lakes of Guatemala, 395*
- Titel, Carte des environs de, 957*
- Tjader, R. The Big Game of Africa, *rev.*, 302
- Tlahuaililo, Hidrología subterránea de la Comarca Lagunera del —, Durango. J. D. Villarelo, 67*
- Tobique District. G. A. Young, 949*
- Tocugirò, N. L'Asie Centrale. Note di viaggio . . . giapponese. Transl. by L. Nocentini, *rev.*, 304
- Toda Land, Dawn in. C. F. Ling, *n.*, 305
- Todd, J. E., joint author, see J. A. Udden.
- Togo: ¶Baumwollfrage in, 396*; Beitrag zur Kenntnis des Klimas von Salaga, Togo und der Goldküste. G. A. Krause, 950*; Der Fischfang der Eingeborenen in den Kolonien Westafrikas. Dr. A. Gruvel, 914*; Togo-Dahomey-Grenzvermessungs-Expedition nebst Mitteilungen über. A. von Seefried, 800*
- Toll, R. H. Notes on Honduras, 789*
- Tölz und die Isarlandschaft. J. Jaeger, 315*
- Tonkin. See also Indo-China, French: ¶Facteurs essentiels de l'acclimatement du bétail européen au. E. Douarche, 315*; From — to India by the Sources of Irawadi. Prince Henri d'Orléans, 237* ¶Map of Tonkin: Carte physique, *n.*, 956*
- Topography: ¶Méthode de l'échantillonnage topographique au service de la morphologie. Prof. J. Brunhes, 74*; Rational Study of Topographic Forms: Topologie. Gén. Berthaut, *rev.*, 361; Rôle des conditions topographiques dans le développement des villes suisses. Prof. P. Girardin, 871*
- Topology: Topologie. Étude du Terrain. Gén. Berthaut, *rev.*, 361
- Torii, R. Les aborigènes de Formosa, 717*
- Tornau, F., joint author, see W. Koert.
- Törnebohm, A. E. Geol. Map of Pre-Quaternary Systems of Sweden, 711*
- Torrés, Diego de. Relation de l'Origine et Succès des Cherifs, et de l'Etat des Royaumes de Maroc, Fez et

- Tarydant, etc. *Mise en François* par M. C. D. V. D. D. A. (1636), 480*
- Toscanelli, Paulo dal Pozzo, In *Memoria di* —. G. Uzielli, 559*
- Totemism, An Analytical Study. A. A. Goldenweiser, 398*
- Toula, F., *joint author*, see E. Böse.
- Touraine, *Topographie gallo-romaine* de la. A. Chauvigné, 718*
- Tournefort [Joseph] Pitton de. *Relation d'un Voyage du Levant, fait par ordre du Roi* (1718), 320*
- Tower, Prof. W. S. Some Factors Influencing the Location and Migration of Industries, 639*; The Story of Oil, *rev.*, 146; Personal, 529
- Townsend, C. H. Illustrations showing Condition of Fur-Seal Rookeries in 1895 and Method of Killing Seals, 240*
- Townsend, C. H. T. Shackleton's Contribution to Biogeography, 479*
- Tozzer, A. M. Preliminary Study of Prehistoric Ruins of Tikal, 949*
- Trabert, Prof. W. Geschwindigkeit der Erdbebenwellen in verschiedenen Tiefen, 318*; Zusammenhang zwischen den Temperaturverhältnissen der Atmosphäre und dem Druck an Erdoberfläche, 74*
- Trade: See Commerce.
- Trade Wind: See under Winds.
- Trail, J. W. H. Flora of the British Islands, 316*
- Transactions of the American Geographical Society, 51, 130, 195, 283, 365
- Transportation. See also Railways, etc.: *Grandi Comunicazioni di Terra e di Mare*. Capt. L. Giannitrapani, *n.*, 946; *Neue Studien über Isochronenkarten*: J. Riedel, 953*; *Einfluss der Technik auf Verkehr und Siedlung*. R. Tronnier, 952*; *Trade Routes, Past and Present—East and West*. R. Kalisch, 399* ¶ *Map: Vie di Comunicazione Mondiale*, 959*
- Transvaal: ¶ *Cotton Cultivation: Prospects in*. T. A. J. Place, 555* ¶ *Maps of Transvaal: Geol. Map of portion of Lower Witwatersrand System on Central Rand*, 956*; *Geol. Survey Sheets. Portions of Waterberg and Rustenburg, Middleburg and Lydenburg, and Marico Dists.*, 231*; *Geol. Survey Sheets. Map of Klip R. Valley*, 231*; *Map of, revised Jan., 1909, n.*, 231; *Sketch Map showing approximate positions of Kimberlite occurrences in the Pretoria District*, 956*; *Zeerust. Portions of Marico, Rustenburg, and Lichtenburg Districts*, 159*
- Travellers' Practical Manual of Conversation, in English, French, German and Italian. E. Marlborough & Co., *n.*, 149
- (Treeman, Ja. (?)). Description of Eastern Coast of the County of Barnstable, from Cape Cod, or Race Point . . . to Cape Malebarre . . . Spots where Seamen may look for shelter, 560*
- Trees, Forestry and Lumbering, List of Books and References, 952*
- Trenk, Oberleut. Bushleute der Namib, ihre Rechts- und Familienverhältnisse, 154*
- Trento al Brennero, Da. G. Cora, 719*
- Treves, Sir Frederick. Uganda for a Holiday, *rev.*, 304
- Trinidad Coal Field, Col. G. B. Richardson, 151*
- Trinidad: Survey of British Imperial Petroleum Questions and technical Description of Oil Fields of. J. D. Henry, *rev.*, 148
- Tripoli: ¶ *Commerce tripolitaïn dans le centre africain*. J. Etiévant, 69*; *Confine occidentale della Tripolitania e le Oasi del Kaur*. L. Cufino, 69*
- Tripoli: ¶ *Map of Tunis-Tripoli Frontier as laid down by Joint Commission of 1910*, 797*
- Tripyramid Mountain, N. H., Petrography of. L. V. Pirsson, 789*
- Trolle, Lieut. *Expédition danoise de Mylius Erichsen à la côte nord-est du Groenland*, 559*
- Tronnier, R. Einfluss der Technik auf Verkehr und Siedlung, 952*; Jean Baptiste Tavernier. *Leben und Reisen . . . Handelsgeographen, usw.*, 74*
- Tropical Regions: ¶ *Alcoolisme dans les colonies et les pays tropicaux*. Dr. Kermorgant, 479*; *Colonisation des Régions Tropicales. Exemple de l'Australie*, 397*; *Bericht über die wichtigsten Faktoren der Akklimatisation europäischen Viehes im warmen Ländern*. Prof. Meuleman, 399*; *Zur Düngung der tropischen Kulturpflanzen*. Dr. Fesca, 317*; *Einige Beobachtungen über tropische Schutzkrusten und Wadibildungen*. Dr. H. Burmester, 73*; *Enquête Intern. sur la main-d'œuvre agricole dans les colonies et les pays tropicaux*, 559*; *Facteurs essentiels de l'acclimatement du Bétail européen dans les pays chauds*. Meuleman, 479*; *Gemüsekultur in den Tropen*, 397*; *Niederschlagsregistr. am Kamerungebirge, 1909-10 unter Berücksichtigung der täglichen Regenverteilung in den*

- Tropen. K. Langbeck, 555*; Periodischen Fehler barometrisch bestimmter Höhenunterschiede in inneren Tropenzone. Dr. Hugershoff, 73*; Pflanzenbau in den Tropen und Subtropen. Dr. M. Fesca, *n.*, 937; Ratgeber für die Ausrüstung von Reisenden nach Übersee u. Tropen. Ch. F. Harford, *n.*, 216; Spécialisation des jardins botaniques dans les recherches d'Agriculture tropicale. Dr. G. Capus, 479*
- Tropic Seas, Through. F. Burnett, *n.*, 380
- Trotter, L. J. History of India, from Earliest Times to the Present Day, 319*
- Trueman, J. D. Gunflint District, Ont., 949*
- Trunk, H., *joint author*, see Joh. G. Rothaug.
- Trusler, J. Habitable World Described . . . Including all the new Discoveries, etc., 240*
- Trypanosomiasis*. See Sleeping-Sickness.
- Tschamler, I. Studie zu Dr. V. Pietzschmanns photogrammetrischen Aufnahmen in Mesopotamien, *n.*, 960
- Tscharner, A.B.B. Travaux de délimitation de frontière anglo-française au nord et au sud de Gambie, 69*
- Tsetse Fly Disease. Further Researches on Development of *Trypanosoma gambiense* in *Glossina palpalis*. Col. Sir David Bruce, Capt. A. E. Hamerton, and Others, 794*
- Tucker, E. W. Five months in Labrador and Newfoundland, during the summer of 1838, 480*
- Tunis: ¶ Carthage and —, the old and new gates of the Orient. D. Sladen, 319*; Date Gardens of the Jerid. T. H. Kearney, 556*; Évolution économique et sociale de la Tunisie. C. de Givenchy, 869*; Les intérêts italiens en Tunisie. C. Fidel, 715*; Notes géographiques sur le Sud Tunisien. A. Joly, 69*; Olivier et le palmier en Tunisie. E. Gallois, 69*; Le Sud Tunisien. L. Pervinquier, 314*; Tunisie. G. Demanche, 155* ¶ Maps of Tunis: Carte de Tunisie au 100,000, 707*; État d'avancement des travaux 1909. Tableau d'assemblage des Cartes d'Algérie et de Tunisie, Serv. Géog. de l'Armée, 547*, 707*; Tunis-Tripoli Frontier . . . Joint Commission of 1910, 797*
- Tunis, City: Transformations de Tunis sous le Protectorat français. F. Ricard, 155*
- Tunnels: Einbruch des Lötschberg-tunnels unter dem Gasterntal. Dr. J. Früh, 71*; Lötschberg Tunnel, 528, 689; Le Tunnel du Simplon. Ed. Barneaud, 316*
- Tunzelmann, G. W. de. Treatise on Electrical Theory and the Problem of the Universe, *n.*, 788
- Turin, Maps: Carta Top. dei Dintorni di Torino, *n.*, 393; Pianta di Torino, *n.*, 393
- Turkestan: Prof. Machaček's Explorations in, 856
- Chinese Turkestan, Maps: Dr. Stein's Maps, 450; Map showing portions of — and Kansu: Portions of Kun-lun Range, Portions of W. and C. Nan-Shan, to illustrate Dr. M. A. Stein's Expl., *n.*, 392*
- Russian Turkestan: ¶ Baumwollernte 1910 in Mittelasien, 717*; Industrie et les mines du Turkestan, 224*; La question kirghize et la colonisation des Steppes. M. J. Castagné, 477*
- Turkey: ¶ Kartographie in der Türkei. A. D. v. Diest, 227*; Physical Environment as a Factor in the Present Condition of. E. Huntington, 719*; Russia and — in the Nineteenth Century, E. W. Latimer, 320*; Le Sultan, l'Islam et les Puissances. Constantinople — La Mècque — Bagdad. V. Bérard, *rev.*, 699 ¶ Maps of Turkey: Empire Ottoman. Carte statistique des Cultes chrétiens. R. Huber, *n.*, 312; Map of Turkey. Kirjali Sheet, *n.*, 711; Turkey in Europe, Eastern and Central, 312*
- Turner, J. K. Barbarous Mexico, *rev.*, 140
- Turner, S. Siberia. Record of Travel, Climbing and Exploration, *n.*, 930
- Tyrrell, J. B. David Thompson, a Great Geographer, 318*; "Rock Glaciers" or Chrystocrenes, 318*
- Tyrrell, J. W. Across Sub-Arctics of Canada. Journey of 3,200 miles by Canoe and Snoeshoe Through the Hudson Bay Region, 319*
- U.
- Udden, J. A., and J. E. Todd. Structural Materials in Illinois, 474*
- Ueckermünde Heide, Geol.-morphol. Übersichtskarte der. H. Seelheim, 710*
- Uganda: ¶ Baumwollerkundung in, 396*; Sleeping Sickness in. P. Mac Queen, 181; Topographical Survey in, 368; Uganda for a Holiday. Sir Frederick Treves, *rev.*, 304
- Uintah Utes, Myths of. J. A. Mason, 221*
- Ule, Dr. W. Glazialer Karree — oder Polygonenboden, 872*

- Ulloa, Don (Antonio) de. *Memoires philosophiques, historiques, physiques, concernant la decouverte de l'Amerique, etc.* (1787), 319*
- Umpleby, J. B. *Geology and Ore Deposits of Republic Mining District, Wash.*, 222*; *Map*, 158*
- Union of South Africa: See *British South Africa*.
- United Kingdom. See also *Great Britain, Ireland and Scotland*: ¶ *Characteristics of British Earthquakes: Summary of Twenty-One Years' Work*. C. Davison, 478*; *Development of Inland Waterways*. H. J. Peddie, 72*; *Flora of the British Islands*. J. W. H. Trail, 316*; *Mountain Climbs*. G. D. Abraham, *n.*, 701; *Recent Progress of Geographical Education in Great Britain*. J. S. Keltie, 872*; *Report of the Progress of Ordnance Survey to March, 1910*, 792*; *State-owned Trans-Atlantic Cable*, 60 ¶ *Climatic: British Climatology*, 621; *Fifth Annual Report Meteor. Committee . . . 1910*, 316*; *British Rainfall, 1908 and 1909*. Dr. H. R. Mill, *rev.*, 539; *Mean Annual Rainfall*. Dr. H. R. Mill, *n.*, 551; *Gulf Stream Drift and British Weather*, 478*; *The Present Position of British Climatology*. H. Mellish, 719*; *Results of hourly Balloon Ascents made from Meteor. Dep. of Manchester Univ.*, 1910, M. White, 559* ¶ *Maps of United Kingdom: Goode's Base Map. British Isles, n.*, 712; *Maps accompanying "The Building of British Isles showing distribution of land and sea through geologic history, 958"*; *Map of the Census Returns, 1911*, 959*; *Maps of lands bordering on the English Channel, 959"*; *Map showing position of Climatological Stations, n.*, 80, 958*; *Positions of stations having self-recording instruments, n.*, 80, 958*; *Positions of Meteor. stations observations from which are used in preparation of daily weather report, n.*, 80, 958*
- United States: ¶ *Great Cities in America*. D. F. Wilcox, *rev.*, 299; *Great Plains in their Relation to Human Occupation and Development*. C. W. Hotchkiss, 635*; *Grosbeaks and their Value to Agriculture*. W. L. McAttee, 948*; *Our Greatest Travelers. Birds that Fly from Pole to Pole and shun Darkness . . .* W. W. Cooke, 788*; *Height and Dominance of the Douglas Fir*. T. C. Frye, 221*; *North American Natural Bridges . . . their Origin*. H. F. Cleland, 151*;
- Relations of Present Profiles and Geol. Structures in Desert Ranges*. C. R. Keyes, 474*; *Quantitative Study . . . Conspicuous Vegetation of Certain Natural Subdivisions of Coastal Plain observed in Traveling from Georgia to New York in July*. R. M. Harper, 66*; *A Small Hanging Valley*. G. B. Roorbach, 449; *Some Stream Waters of Western — with chapters on Sediment carried by Rio Grande, etc*. H. Stabler, 948*; *Surface Water Supply of the Great Basin, 1909*. E. C. La Rue and F. F. Henshaw, 635*; *United States, 222"*; *Variations periodiques des glaciers, XVe Rapport. 1909. États-Unis. [In English.]* H. F. Reid, 635*; *Western America*. C. Wilkes, 400*; *Winter in the West*. [C. F. Hoffman], 560* ¶ *Conservation and Reclamation Service: Arid Regions of the U. S. and Reclamation Service. Lecture* C. J. Blanchard, 51; *Observation of Future Lumber Supply*. T. B. Walker, 714*; — *of Natural Resources*. J. Douglas, 474*; — C. R. Van Hise, *rev.*, 295; *Drainage Examinations and Surveys in Georgia by U. S. Dep. of Agriculture, Prel. Report, 880"*; *Fight for Conservation*. G. Pinchot, *n.*, 388; *Forest Fires and their prevention, etc*. J. S. Holmes, 960*; *Official Proceedings of the Eighteenth National Irrigation Congress*. A. Hooker, *editor*; *Progress of Game Protection in 1910*. T. S. Palmer and H. Oldys, 948*; *Protecting Our Forests from Fire*. Hon. J. Wilson, 394*; *Reclamation of Arid West*. F. H. Newell, 714* ¶ *Economic and Commercial: Agricultural Production, 475"*; *Cotton Industry*. T. M. Young, 319*; *Cotton Production and Statistics of Cottonseed Products, 1910*, 948*; *Supply and Distribution of Cotton for the year ending Aug. 31, 1910*, 222*; *Consumption of Firewood*. A. H. Pierson, 151*; *Dry Farming in Relation to Rainfall and Evaporation*. L. J. Briggs and J. O. Belz, 523; *Fur-Trade on the Upper Lakes, 1778-1815, 314"*; *Future Wheat Supply*. Prof. M. A. Carleton, 151*; *Present Forestry Issues*. Hon. C. Guild, Jr., 394*; *Potash Industry*. G. E. Mitchell, 789*; *Rice in the U. S.* G. T. Surface, 500; *Saving our Fish*. D. Wallace, 948*; *State Ownership of Forests*. A. F. Hawes, 553*; *Territorial Trade of the U. S.*, 948*; *Water Powers in the Northwest*. W. E. Herrin, 221*

¶ Economic Geology: Economic Geology. With special Reference to the U. S. H. Ries, *rev.*, 219; Contributions to —. Metals and nonmetals except Fuels, 394*; Contributions to —, 1908. Mineral Fuels, 222*; Mineral Paints. B. L. Miller, 789*; Miscellaneous Nonmetallic Products. J. S. Diller, C. Butts and Others, 867*; New Source of Power [Lignite]. G. E. Mitchell, 72*; Phosphates. H. S. Gale, R. W. Richards and E. Blackwelder, 221*; Our Greatest Plant Food. G. E. Mitchell, 317*; Government Phosphate Lands, 366; Searching for Mineral Fertilizers, 777; Structural Materials. E. F. Burchard, A. H. Purdur and Others, 221* ¶ Geographic Nomenclature: Decisions of the U. S. Geographic Board, 66, 394, 475, 715, 289, 867, 948*; Revision of Previous Decisions, 635*, 715* ¶ Government Publications, How to Secure —, 222* ¶ Government and Other Reports: Annual Report Statistics of Railways for 1909, 394*; Atlantic Deeper Waterways Association. Report of Proceedings, 1909, 635*, and Summary of Papers on the Subject with Statistics of Coastwise Commerce, 635*; Reports of American Bison Society, 222* Report of Chief of the Bureau of Insular Affairs, 1910, 867*; — of Chief of the Weather Bureau, 1909-10, 867*; Report on Progress and Condition of U. S. National Museum for 1910, 789*; River and Harbor Improvements. Report Chief Engineer, 1910, War Dep., 867*; Tenth Annual Report Governor of Porto Rico, 1910, 868*; Reports of Commissioner of Education, and of Commissioner of the Interior, 1910, 868*; Twenty-Fourth Annual Rep. of Interstate Commerce Commission, 554*; For Reports of Different Bureaus for Philippine Islands, see under Philippine Islands ¶ Historical: Annual Report of the Historical Association for 1908, 222*; Dutch Republic and American Revolution. F. Elder, 800*; Early Dutch Immigration to the U. S., 917; The Fight for the Northwest, 1860. W. E. Dodd, 948 ¶ Indians: Chumash and Costanoan Languages. A. L. Kroeber, 221; Chippewa Music. F. Denmore, 474*; Ethno-Botany of the Gosiute Indians. R. V. Chamberlin, 788*, 867*; Great Mysteries of the Cheyenne. G. B. Grinnell, 553*; Handbook of American Indian Languages,

367; Indian Tribes of the Lower Mississippi Valley and Adjacent Coast of the Gulf of Mexico. J. R. Swanton, 789*; Iroquois Uses of Maize and other Food Plants. A. S. Parker, 714*; Myths and Legends of the Pacific Northwest. K. B. Judson, *rev.*, 373; Myths of Uintah Utes. J. A. Mason, 221*; Old North Trail; or Life, Legends and Religion of Blackfeet Indians. W. McClintock, *n.*, 533; Origin of Iroquois Silversmithing. A. C. Parker, 394*; Shasta Myths. R. B. Dixon, 394* ¶ Meteorology: Free Air Data Mt. Weather, for April, May and June, 1910. Wm. R. Blair, 394*; Frost Data of the U. S. P. C. Day, 523; Inversion of Temperature Amplitudes and Departures in the U. S. F. H. Bigelow, 221*; Monthly Weather Review for 1910, 553*; New Monthly Cloudiness Charts for, 618; Report of the Chief of U. S. Weather Bureau, 1908-09, 74*; U. S. Weather Bureau Collecting Meteor. Photographs, 692 ¶ Minerals and Metals: Appraising our Coal Lands, 133, Coal and Lignite. C. M. Butts, M. R. Campbell and Others, 553*, Our Coal-Mining Industry in 1910, 133, Half a Billion Tons of Coal, 778; Coke Industry. R. Moldenke, 221*; Conservation of Iron. A. S. Cushman, 867*; Production of Iron Ore, Pig Iron and Steel in 1909. E. F. Burchard, 284; Increased Metal Production in 1909. W. Lindgren, 522; Mineral Resources, 776; Mineral Resources of Wyoming and Mining Laws of the State and of the U. S. C. E. Jamison, 880*; Die mineralischen Schätze der Vereinigten Staaten. Dr. F. Macháček, 221*; Mining Industry in 1909 and Alaska Coal and its Utilization. A. H. Brooks, 553*; Rare Metals. F. L. Hess, 789; Sulphur and Pyrite. R. W. Richards and J. H. Bridges, 789*; Types, Modes of Occurrence, and Important Deposits of Asbestos in. J. S. Diller, 867* ¶ Population and Race Problems: European Population in the U. S., 474*; Distribution of Population in. A. P. Brigham, 947*; Population of the U. S. H. Gannett, 394*; Thirteenth Census, 52; Geographic Influences in American Slavery. F. V. Emerson, 13, 106, 170; Highlanders of the South. S. H. Thompson, *rev.*, 295; Scandinavian Element in American Population. K. C. Babcock, 394*; Studies in American Race Problem. A. H. Stone, *rev.*, 298 ¶ Skeleton or

Plotting Charts. Suggestion Laid before the Hydrographic Office. Lieut. R. Stone, 635* ¶ Surveys: State Geological Surveys, 365; Survey of Northern and Northwestern Lakes, 789*; Survey Methods and Costs for a Large Area. E. Wilson, 222*; U. S. Geological Survey: [Description of its Lines of Work.] R. H. Chapman, 553*, Results of Triangulation and Primary Traverse for 1906, '07 and '08, 222*; U. S. Coast and Geodetic Survey: Directions for Magnetic Measurements. D. L. Hazard, 867*; Results of Observations made at Sitka, 1907-8. D. L. Hazard, 867*; Results of Magnetic Observations, 1909-10. R. L. Faris, 635* ¶ Transportation: American Highways. N. S. Shaler, 400*; Comparison of Trans-Appalachian Railroads. A. E. Parkins, 314*; Earning Power of Railroads, 1909. Compiled by F. W. Mundy, *n.*, 218; General Catalogue of Mariners' Charts and Books, 314*; New Transcontinental R.R., 519; Our Inland Seas. Shipping and Commerce. J. C. Mills, *rev.*, 139; Revenues and Expenses of Steam Roads, 1909-10, 789*; Review of Waterway Problem. R. M. Brown, 573; Railway Stat. for 1910. Compared with Official Rep. of 1909 and Recent Stat. of Foreign Railways, 554*; Railroad Promotion and Capitalization in. F. A. Cleveland and F. W. Powell, *n.*, 218; Telegraph and Cable Systems of Alaska and Philippine Islands and Operations in U. S., 948*; Westward by Rail: The New Route to the East. W. F. Rae, 400* ¶ Colonies: États-Unis et les Philippines. M. Marchand, 948*; Our Islands and their People, as seen with Camera, etc. J. de Olivares (*et al.*), 319* ¶ Maps of the United States: Ergebnisse der Volkszählung in den Vereinigten Staaten . . . 1910. H. Wichmann, *n.*, 309; Goode's Base Maps, *n.*, 712; Map to show Mean Annual Cloudiness, 546*; Twelve Maps to show mean cloudiness for each month, 546*; Map showing Glacial Geology of — and Canada, *n.*, 954; Map of Twenty-two Spanish and American Trails and Routes Affecting California, 1694-1849, 799*; Physical Map of, *rev.*, 799; Wasserstrassen im östlichen Teile der Vereinigten Staaten, 77* ¶ Biological Survey Maps, 546, 795 ¶ Bureau of American Ethnology Maps, 632, 706; Indian Tribes of the

Lower Mississippi and Adjacent Gulf Coast. J. R. Swanson, 633* ¶ Bureau of the Census: Maps: Cotton production in 1909, 229*; Map showing increase per cent. of the population of each State between 1890 and 1900, Map — between 1900 and 1910, 955* ¶ General Land Office map, 795 ¶ Smithsonian Institution Maps, 158; U. S. Coast and Geodetic Survey Charts, 76, 157, 309, 470, 545, 631, 875; Four base maps of: Distribution of Principal Astronomic Stations, Positions and Connections of Telegraphic Longitude Stations from 1846 to 1910; Routes of Geod. Spirit Levelling and Positions of Gravity and Tide Stations to 1910; Positions of Magnetic Stations Occupied to June 1910, Report for 1909-10, 470*; Cape Flattery to Dixon Entrance, 631*; Sketch of General Progress, Report for 1909-10, 470* ¶ U. S. Department of Agriculture Maps, 77, 158, 229, 389 ¶ U. S. Geological Survey Maps: 75, 157, 228, 308, 389, 544, 629, 706, 794, 873, 953; Distribution of Granite Quarries and Granites in Southeastern Atlantic States, 76*; Map showing Appalachian troughs and principal lines along which stratigraphic overlaps are common, 954*; Map showing condition of astronomic location and Primary Control to Jan. 1, 1909, *n.*, 229; Topographic Maps and Geol. Folios to Jan. 1, 1911, *n.*, 308; Top. and Geol. Index Map showing Progress in Surveying and Engraving, *n.*, 308; United States. Revised Edition, 1 Sheet, *n.*, 76; United States. Relief Map. H. Gannett, *n.*, 76 ¶ U. S. Hydrographic Office Charts: For Pilot Charts of the Oceans see Atlantic and Pacific Oceans. ¶ U. S. Lake Survey Office Maps, 229, 875 ¶ U. S. Weather Bureau Charts, 158, 229, 300, 480, 546, 622, 706, 795; Average Date of First Killing Frost in Autumn, *n.*, 546; Average Date of the Last Killing Frost in Spring, *n.*, 546; Earliest Date on which a Killing Frost occurred in Autumn, *n.*, 546; Latest Date on which a Killing Frost has occurred in Spring, *n.*, 546; Average Length of the Crop-Growing Season Days, *n.*, 546; Meteorological Maps, 795* ¶ War Department Maps, 622, 875 Universe: ¶ Cosmos: Sketch of Physical Description of the Universe. A. von Humboldt, 220*; Evolution of Worlds. P. Lowell, *n.*, 388; Recent Researches in the Structure of the Uni-

- verse. Dr. J. C. Kapteyn, 640*; Treatise on Electrical Theory and the Problem of the —. G. W. de Tunzelmann, *n.*, 788; Universe, or, the Wonders of Creation. F. A. Pouchet, 320*
- Ural, Expedition of Kuznezov Brothers to the Polar — in 1909. [In Russian.] O. O. Baklund, 559*
- Urbina, F., *joint author*, see J. Engerand.
- Uruguay: ¶Uruguay. W. H. Koebel, *rev.*, 695; Republica Oriental del Uruguay en 1910 según los datos consignados por la Cámara Mercantil de productos del país. R. V. y Sevilla, 790*
- Usu-San Eruption and Earthquake and Elevation Phenomena. F. Omori, 951*
- Utah: ¶Coal Fields . . . N. E. Utah. H. S. Gale, 313*; San Juan Oil Field. H. E. Gregory, 474* ¶Maps of Utah: Fish Springs Quad., 76*; Frisco Special Map, 389*; Geol. Map of Crawford Mts., 229*; Geol. Map of Phosphate Deposits near Woodruff, 229*; Jensen Quad., 76*; Map of San Juan Oil Field, *n.*, 630; Map showing Extent of Phosphate Reserve, 229*; Maps showing areas investigated and described in Water-Supply Papers, 875*; Reconnaissance Geol. and Top. Map of part of Jensen Quad., 157*; State of Utah, *n.*, 795
- Uxmal, the City of Xius. Ancient Temples and Cities of the New World. S. G. Morley, 635*
- Uzielli, G. In Memoria di Paulo dal Pozzo Toscanelli, 559*
- V.
- Vacca, Prof. G. Valore morale del popolo cinese, 717*
- Vageler, Dr. P. Einfluss der klimatischen Faktoren auf die Vegetation im allgemeinen und speziell auf die Höhe des Pflanzenertrages, 872*
- Valdés, R. M. Geografía del Istmo de Panamá, 640*
- Vallejos, C., *joint author*, see F. Malaga Santolalla.
- Valleys: ¶Geological Expedition to East African Rift Valleys. E. F. Kirschstein, 856; Les Origine de la vallée de la Charente. Ch. Passerat, 871*; Valley Filling by Intermittent Streams. A. E. Parkins, 719* ¶Hanging Valleys of the Yosemite. D. W. Johnson, 826, 890; A Small Hanging —. G. B. Roorbach, 449
- Vallot, H. Progrès récents de topographie et géodésie de haute montagne en France, 73*
- Valparaíso Earthquake, Relief Model showing effects of. G. C. Curtis, 525
- Vancouver Island, Triangulation and Spirit Levelling of. R. H. Chapman, 554* ¶Map of Vancouver Island, *n.*, 955
- Vanden Plas, J. Étude sur les Kuku, 476*
- Van Hise, Dr. C. R. Conservation of Natural Resources in the U. S., *rev.*, 295
- Var Supérieur, Étude de Géographie physique. J. Sion, *rev.*, 464
- Vasconcellos Galvão, S. de. Dicionario chorographico, historico e estatistico de Pernambuco, 223*
- Vassal, Madame G. M. Life in Annam, 717*; Visit to the Philippines, 397*
- Vaudois or Waldenses, Narrative of an Excursion to the Mountains of Piemont . . . and Researches among the. W. S. Gilly, 238*
- Vay De Vaya and Luskod, Count. Empires and Emperors of Russia, China, Korea, and Japan, 319*
- Veatch, A. C. Coal Deposits near Pinedale, Navajo Co., Ariz., 867*; Map of, 630*
- Veddas, The. C. G. and B. Z. Seligmann, *rev.*, 930; map, 956*
- Vegetation: See Plants.
- Veitch, J. H. Traveller's Notes, or, Notes of a Tour through India, Malaysia, Japan . . . 1891-93, 240*
- Vellani, E. Il primo congresso degli Italiani nel Cile, 790*
- Vener Lake, Water Level of —, Its Periods and Regulation. A. Wallén, 478*
- Venezuela: ¶Commercial —: Analysis of its Export and Import Trade. J. J. Macfarlane, 869*; Ferrocarril de la Guaira a Caracas. J. Flind, 636*; Geologic and Petrographic Notes on the Region about Caicara. T. A. Bendrat, 715*, 790; Vías de Comunicación de la . . . Comisión Científica Explor. del Occidente de. A. Jahn, 950* ¶Maps of Venezuela: Camino de Maturín á Caño Colorado, 876*; Centros Pecuarios del Estado Monagas, 876*; Croquis de los caminos de recuas entre Santa Lucia, Caucagua y Guatire, 955*; Croquis demostrativo del Estado de los Trabajos del mapa físico y político de, 876*; Estado actual de la Triangulación, 876*; Exploración del Camino del "Alto Cocoyar" á Maturín, 876*, — de los Caminos que unen á Maturín con

- Puerto San Juan, 876*; — del Rio Guarapiche entre Maturin y Caño Colorado, 876*
- Venus, Daylight Observations on. J. P. Ault, 767
- Verde Island Passage to Cuyo, P. I., Anchorage. Chart U. S. Coast and Geod. Surv., 631*
- Vermont: ¶ Population, 13th Census, 1910, 948*; Results of Spirit Levelling, 1896-1909. R. B. Marshall, 66*
- Vernyi, Tremblement de terre de. J. Deniker, 637*
- Verrazzano, Giovanni da — and His Discoveries in North America . . . according to . . . Cellere Codex of Rome. Prof. A. Bacchiani. English version by E. H. Hall, 221*
- Vervloet, Lieut. G. Aux Sources du Nil. Dans la région des volcans, du lac Albert-Edouard et du Ruwenzori, 556*
- Vetch, Col. R. H., *editor*. Life of Lieut.-Gen. the Hon. Sir Andrew Clarke, 320*
- Vialar, Baron de. Les Beni-Messaoud, 476*
- Victoria, Antarctic Land of —. From the voyage of "Discovery." M. Zimmermann, 478*
- Victoria, Australia: ¶ Contribution to Physical History of Plenty R. and Anderson's Creek, Warrandyte. J. T. Jutson, 226*; Notes on Geology of the Country about Anglesea. T. S. Hall, 397* ¶ Map: Victoria. 8 Sheets Geologically compiled and colored by R. Everett, *n.*, 311
- Victoria Falls: Viktoriafälle des Sambesi und ihre Umgebung. J. Brunnthaler, 717*
- Vidal de la Blache, P. Interprétation géographique des paysages, 873*; Atlas général Vidal-Lablache, *n.*, 312
- Vienna, Map: Orientierungsplan von Wien, Verkehrsplan der k.k. Reichshaupt u. Residenzstadt, *n.*, 311
- Vignaud, H. Ancienne et nouvelle campagne pour la canonisation de Christophe-Colomb, 74*
- Villarello, J. D. Hidrología subterránea de la Comarca Lagunera del Tlahuaililo, Durango, 67*
- Villatte, N. A travers le Sahara, 637*; Account of his journey, 526
- Villepelet, F. Syndicat de Navigation à Périgueux pour la rivière de l'Isle en 1520, 719*
- Villiers, J. A. J. de. Foundation and Development of British Guiana, 950*; see also, C. A. Harris *joint author*.
- Vincent, H. Bamboo Pulp as the Paper Material of the Future, 719*
- Vinci, Leonardo da. Pianta d'Imola. Facsimile of a MS. Map by, 799*
- Vineyard Sound and Buzzards Bay, Chart U. S. Coast and Geod. Surv., 158*
- Viollet, H. Au pays du chemin de fer de Bagdad, 951*
- Virginia: ¶ Cement Resources of — west of Blue Ridge. R. S. Bassler, 880*; Hydrography of. Geological Series. N. C. Grover and R. H. Bolster, 880*; Mineral Resources. T. L. Watson, 880*; Powell Mountain Coal Field. M. R. Campbell and E. G. Woodruff, 788*; Results of Spirit Levelling, 1896-1909. R. B. Marshall, 66*; Transition in — from Colony to Commonwealth. C. R. Lingley, *n.*, 295 ¶ Maps of Virginia: Abingdon Quad., 629*; Antietam Quad., 75*; Map to Show Distribution of Granites and Granite Quarries, 76*; Sketch Map of Powell Mountain Coal Field, 630*; Charts U. S. Coast and Geod. Surv.: Atlantic Coast from Cape Henry to Cape Lookout, 309*; Hampton Roads, 875*; James River. Hampton Roads to Point of Shoals, 309*
- Vitoria, G. Tierras fiscales de la colonia Caroya (Córdoba), 868*
- Vivaraïs, Haute-Loire et le Haut —. M. Boule, *n.*, 947
- Vladivostok, 637*
- Voikov, A. Climate of Kislovodsk and Comparison with Other Climatological Stations [In Russian], 793*
- Volcanoes and Vulcanology: ¶ Besuch des Vulkans auf der Samoa-Insel Sawail. Oberleut. Schnoeckel, 792*; Eruption of Etna, 858; Hawaii and its Volcanoes. C. H. Hitchcock, *rev.*, 210; Mechanism of Volcanic Action. H. J. Johnston-Lavis, 479*; Nachrichten über den Ausbruch des Matavau auf Savaii . . . 1909-10. Prof. Dr. K. Sapper, 638*; Tarawera Eruption and After. Prof. J. Park, 638*; Usu-San Eruption and Earthquake and Elevation Phenomena. F. Omori, 951*; Volcanoes of Kilauea and Mauna Loa, Hawaii. W. T. Brigham, *rev.*, 141 ¶ Geographische Bedeutung der Vulkane. Dr. K. Sapper, 74*; Mécanisme de l'activité volcanique. Prof. H. J. Johnson-Lavis, 73*; Project for International Institute of Vulcanology in Naples. Dr. E. Friedländer, 60; Rôle de l'eau dans les phénomènes éruptifs. A. Ricco, 74* ¶ Maps: Duke of Mecklenburg Ex-

- pedition's field of work; Volcanic District, German East Africa, 956*; Map showing Relation of Recent Vulcanism to Principal Tectonic Lines, *n.*, 472; Map showing Relation of Volcanic and Seismic Phenomena in West Hokkaido, 797*; Map of Usu Volcano, Japan, *n.*, 877; Sketch Map of the Taal Volcano Region, 957*; Map of Esan Volcano, 877*; Top. Map of Northern Flank of *USU-SAN* showing distribution of 45 Craterlets, etc., 797*
- Volga. F. Homburg, 227*
- Volk, E. Archaeology of Delaware Valley, 800*
- Volkens, G., *joint author*, see A. Engler.
- Volz, Dr. W. Absence of Religious Conceptions among the Kubus of Sumatra, 686; Ausrüstung und Reisepraxis. Erfahrungen auf Forschungsreisen in Niederländisch-Ost-Indien, 638*; Nord-Sumatra. Bericht... der Humboldt-Stiftung der Königl. Preuss. Akad. d. Wiss. zu Berlin, 1904-06 ausgeführte Forschungsreise. Band. I. Batakländer, *rev.*, 377; Reise durch das Hinterland von Liberia im Winter 1906-7, 476*; Südost-Asien bei Ptolemäus, 315*
- Voyages: ¶Early Voyages: Collection of Curious Travels and Voyages. J. Ray (1693), 320*; Early Spanish Voyages to the Strait of Magellan. Introduction and Notes by Sir Clements Markham, 800*; L'Epoca delle grandi Scoperte geografiche. C. Errera, *n.*, 787; Über die Fahrten der Novgoroder durchs karische Meer und über den Weg durch die Halbinsel Jalmal zum Ob. A. Sibiriakoff, 70*; Giovanni da Verrazzano and His Discoveries in North America... according... Cellere Codex of Rome. Prof. -A. Bacchiani. English Version by E. H. Hall, 221*; Ibn G'ubayr. Viaggio in Ispagna, Sicilia, Siria, Palestina, etc., etc., nel Secolo XII. Prima traduzione... Arabo. C. Schiaparelli, *rev.*, 216; Itinerario Voyage ofte Schipvaert van Jan Huygen van Linschoten naer oost ofte Portugaels Indien 1579-1592. Edited by Dr. Kern, 951*; Journey through Sweden... particulars relating to History of Denmark, etc. Written in French by a Dutch Officer, and Translated by W. Radcliffe, 239*; Jean Baptiste Tavernier. Leben und Reisen... Handelsgeographen des 17. Jahrhunderts. R. Tronnier, 74*; Relation d'un Voyage du Levant, fait par ordre du Roi. [Joseph] Pitton de Tournefort, 320*; Summary of the confession of the pilot... 1579 Summary of the Voyage of the *Corsair*. Report on a Part of Sir Francis Drake's Famous Voyage of Circumnavigation made by his prisoner, the Portuguese, Nuño de Silva to the Tribunal of Inquisition of Mexico. Transl. by Z. Nuttall, 873*; Voyage de l'Ambassade de la Compagnie des Indes Orientales Hollandaises... 1794, etc. André Everard van Braam Houckgeest. Publié en français par M. L. E. Moreau de Saint-Méry, 237*; Voyage d'André Michaux en Syrie et en Perse (1782-85) d'après son journal et sa correspondance. Dr. E. T. Hamy, 870*; Voyage to the Coast of Africa in 1758. J. Lindsay, 400*; Voyages to Various Parts of the World, and Remarks on Different Countries in Europe, Africa, etc. J. Willock, 240* ¶Library of Travel, Exploration and Adventure, 240*; Steam Voyages on the Seine, the Moselle, the Rhine; with Railroad Visits... Cities of Belgium. M. J. Quin, 239*; Travels from Berlin, through Switzerland to Paris in 1804. A. v. Kotzebue, 238*; Traveler's Notes, or, Notes of a Tour through India, Malaysia, Japan... 1891-93. J. H. Veitch, 240*; Two Hundred and Nine Days; or, The Journal of a Traveller on the Continent. T. J. Hogg, 239*; Voyage autour du Monde. Exécuté pendant les Années 1830-32, sur la Corvette Favorite, Atlas Hydrogr. [Cyrille Pierre Théodore] Laplace, 239*; Wanderings in New South Wales, Batavia, Pedir Coast, Singapore, and China... 1832... 1834. G. Bennett, 239*
- Vries, P. de & Zoon. Kaart der Tabaksondernemeningen ter Oostkust van Sumatra. Tevens aangevende de Koffeondernemeningen, *n.*, 232
- W.
- Waagen, L. Die unteriridische Entwässerung im Karst, 315*
- Wace, A. J. B., and M. S. Thompson. Distribution of Early Civilization in northern Greece, 871*
- Wachner, H. Das siebenbürgische Erzgebirge, 316
- Wadai: ¶Les Événements du Ouadai et la Mort du Colonel Moll. R. de Caix, 224*; Kämpfe der Franzosen im Wadailande, 315*; Occupazione dell' Uadai. L. Cufino, 68*; Ouadai

- Aouali. Lieut. Lucien, 556* **¶** Maps of Wadai: Frontière Ouadai-Darfour, 78*; Schéma du Massif et itinéraire de la Compagnie Arnaud, 956*
- Waddell, L. A. Tibetan Invasion of India in 647 A. D. and Its Results, 396*, Chart, 310*
- Wadis: Einige Beobachtungen über tropische Schutzkrusten und Wadibildungen, Dr. H. Burmester, 73*
- Wagner, Dr. H. Die Pflege der Geographie an der Berliner Universität im ersten Jahrhundert ihres Bestehens, 316*; — *et al.* Geographisches Jahrbuch, for 1910, 560*; Award of Culum Geographical Medal to, 52, 283
- Wagner, P. A. Origin of German South-West African Diamonds, 69*
- Wahnschaffe, Prof. Dr. F. Exkursion des XI. Intern. Geol.-Kongresses nach Spitzbergen, 479*; Grosse erratische Blöcke im norddeutschen Flachlande, *n.*, 215; Oberflächengestaltung des Norddeutschen Flachlandes, *rev.*, 212; — nach Wahnschaffe. Dr. R. Fox, 558*
- Walcott, C. D. Abrupt Appearance of Cambrian Fauna on North American Continent, 151*; A Geologist's Paradise [Canadian Mountains], 868*; Pre-Cambrian Rocks of the Bow River Valley, Alberta, 222*; Personal, 861
- Waldmann, S. Les Esquimaux du Nord du Labrador, 554*
- Waldo, F. L. Popocatepetl, 636*
- Waldeemüller, Martin. Saint-Dié's Celebration of Printing of —'s Cosmographie Introductio, 290
- Walker, T. B. Conservation of Future Lumber Supply, 714*
- Wallace, D. Saving our Fish, 948*
- Walle, P. Au Brésil. Du Rio São Francisco à l'Amazone, *n.*, 534; Territoire fédéral l'Acre et la ligne du Madeira au Mamoré, 636*
- Wallén, A. Water Level of Lake Vener, Its Periods and Regulation, 478*
- Walser, Dr. H. Zur Geographie der politischen Grenzen, 318*
- Walter, A. Sugar Industry of Mauritius: Study in correlation, including Scheme of Insurance against Damage by Cyclones, 918
- Walter, E. Unsere Kameruner Eisenbahnen, 314*
- Walther, Prof. J. Origin and Peopling of the Deep Sea, 318*
- Warburg: Geol. Übersichtskarte der Warburger Störungszone, 958*
- Ward, H. J. B. Mysterious Morocco and how to appreciate It, *n.*, 304
- Ward, L. K. Geology of Tasmania. The Pre-Cambrian, 226*
- Ward, R. DeC. Economic Climatology of the Coffee District of São Paulo, 428
- Wasatch Mountains, Utah, New Light on Geology of. E. Blackwelder, 635*
- Washburne, C. W. Canon City Coal Field, Col., 152*; Florence Oil Field, 152*; Gas Prospects in Harney Valley, Ore., 474*; Gas and Oil Prospects near Vale, Ore., and Payette, Idaho, 474*; South Park Coal Field, Col., 152*; see also G. C. Martin, *joint author.*
- Washington, D. C.: Bohn's Handbook of Washington. C. Lanman, 400*; Stranger's Guide, or, the Daguerreotype of Washington, D. C. compiled by E. S. Streeter, 560*
- Washington, State: **¶** Altitudes in the, 522; Geology and Ore Deposits of Republic Mining District. J. B. Umpleby, 222*; Irrigated Lands of. G. M. Allen, 714*; Road Materials. H. Landes, 880* **¶** Maps of Washington: Geol. Map of Blewett District. C. E. Weaver, 796*; Index Map to Atlas Sheets, *n.*, 631; Soil Survey Maps of Eastern part of Puget Sound, 390*; Map of the State, 158*; Geologic Map of Republic District. J. B. Umpleby, 158*; Pullman Quadr., 308*; Mt. Vernon, Quincy, Red Rock and Winchester Quadrangles, 308*; Zillah Quad., 75*; Charts U. S. Coast and Geod. Surv.: Cape Lookout to Gray's Harbor, 76*; Sea Coast and Interior Waters from Gray's Harbor to Semiammoo Bay, 76*, 875*; Gray's Harbor, 76*; Willapa Bay, 309*
- Water: **¶** Arbeit des fließenden Wassers. A. Hettner, 317*; Conservation of —. J. L. Mathews, *rev.*, 306; Experiments on Settlement of Solids in. Water. Dr. J. S. Owens, 317*
- Watkins, A. Outline of Nebraska History, 553*
- Watson, T. L. Mineral Resources of Virginia, 880*
- Wauters, A. J. Le Général Sanford. Reconnaissance de l'Association du Congo, 791*; Le Transafricain de Matadi à Dar-Es-Salam, 716*
- Weaver, C. E. Geological Map of Blewett District, Wash., 796*
- Weaving Looms: Spinn- und Webwerkzeuge. M. von Kimakowicz-Winnicki, 72*
- Weber, Prof. Dr. L. Wind und Wetter, *rev.*, 787

- Weddell Quadrant, Meteorology in — during 1909. R. C. Mossman, 72*
- Weeks, J. H. Congo Medicine-Man and His Black and White Magic, 555*
- Wegemann, C. H. Map of Salt Creek Oil Field, Wyo., 706*; Notes on Coals of the Custer National Forest, 222*; Salt Creek Oil Field, Wyo., 948*; see also H. S. Gale, *joint author*.
- Wegener, Dr. G. Yangtsekiang als Weltverkehrsstrasse, 870*
- Weigall, A. E. P. Guide to the Antiquities of Upper Egypt, *n.*, 927
- Weisgerber, Dr. H. Les Blancs d'Afrique, *n.*, 64
- Weiss. Reise durch die Eingeborenstaaten in Westszechuan, 224*
- Weiss, Lieut. M. Duke of Mecklenburg Expedition's Field of Work (Map), *n.*, 956
- Weissberger, D. J. A. Noticia de una exploración geográfica y arqueológica en el Norte del Asia Menor, 224*
- Weller, Dr. E. August Petermann: Ein Beitrag zur Geschichte der geographischen Entdeckung und der Kartographie im 19. Jahrhundert, *rev.*, 845
- Wellington Harbor, Physiography of. J. M. Bell, 191
- Wells to Cape Ann, Mass., Chart U. S. Coast and Geod. Surv., 158*
- Werbata, J. V. D. Topographische Opneming van het Eiland Curaçao, 152*
- Werth, Dr. E. Über den Begriff Inlandeise, nebst Bemerkung über die Schneegrenze in den polaren Ländern, 639*
- Wertheimer, F. Japanische Kolonialpolitik, *n.*, 377
- West Indies. See also Antilles, Cuba, Porto Rico, etc.: ¶Buccaneers in the West Indies in the XVIIth Century. C. H. Haring, *rev.*, 457; Privateers and Privates of the —. V. Barbour, 636*; Sketches and Recollections of, 400*; Winter in the — and Florida, 400*
- West Pilbara Goldfield, Geology and Ore Deposits of. H. P. Woodward, 638*
- Westphalia: Städte des rheinisch-westfälischen Industriebezirks. Dr. K. Olbricht, 398*
- Weston, S. Notes on an Expedition into the Interior of North-West Australia, 1908-9, 156*
- [Weston, Stephen]. La Scava; or, some Account of Excavation of a Roman Town on the Hill of Châtelet, etc., 239*
- West Virginia, Maps: ¶Antietam Quad., 75*; Clay, Fayetteville, Gassway and Montgomery Quadrangles, 76*; Peytona Quad., 629*; Sketch Map showing oil and gas fields, location of quadrangles and nature of geol. reports published on each, 874*; Spencer Area, 77*; Sutton Special Quadr., 308*
- Western Australia. See under Australia.
- Whales: Grytriken [Whaling Station in South Georgia], 872*; Shore Whaling: A World Industry. R. C. Andrews, 872*
- Wheeler, A. O. Expedition to Spillimacheen Mts., Photo-Top. Surveys, 868*
- Whitaker, J. Almanack for . . . 1911, 320*
- Whitbeck, R. H. Geographical Influences in the Development of New York State, 475*; Regional Peculiarities in Place Names, 273
- White, J. Place-Names in the Thousand Islands, 222*
- White, J. A. How to Use Contour Handmaps for Class Teaching, *n.*, 946
- White, M. Results of Hourly Balloon Ascents made from Meteor. Department, Manchester Univ., 1910, 559*
- White Mountains, Bibliography of. A. H. Bent, *n.*, 781
- White Sea: Winds and Ice in the White Sea and Novaya Ziemla in 1910 [in Russian]. I. Anufrief, 559*
- Whitley, Rev. D. G. Ivory Islands in the Arctic Ocean, 398*
- Whitlock, H. P. Calcites of New York, 960*
- Whitlock, Maj. G. F. A. Yola-Cross River Boundary Commission, 396*
- Who's Who, 1911, 320*
- Whymper, Edward, *Obituary*, 861
- Wichmann, H. Binneneiswanderungen in Spitzbergen, 398*; Ergebnisse der Volkszählung in den Vereinigten Staaten von Amerika, 1910, *n.*, 309; Grosstädte des Deutschen Reichs, 398*
- Wickenburg, E. Graf. v. —'s Reisen in Südamerika 1907-10 (Map), *n.*, 78
- Wilcox, D. F. Great Cities in America, *rev.*, 299
- Wilhelm, I. La Durance. Utilisation de ses eaux, etc., 559*
- Wilke, Dr. G. Spiral-Mäander . . . Gefässmalerei Hellenen und Thraker. Früh und vorgeschichtliche Kultur, usw., *n.*, 216
- Wilkes, C. Western America, 400*

- Wilkes Land, Australian Antarctic Exped. to Explore, 138
- Wilkinson, G. Sketches of Chinese Customs & Manners, in 1811-12, etc., 237*
- Williams, M. Y. Arisaig-Antigonish District, N. S., 949*
- Williams, R.R. Economic Possibilities of Mangrove Swamps of the Philippines, 951*
- Williamson, N., murdered on Assam-Tibet Borderland, 686
- Willock, J. Voyages to Various Parts of the World, and Remarks on Different Countries in Europe, Africa and America, etc., 240*
- Wilson, A. W. G. Department of Mines of Canada, its Organization and its Work, 475*; Geology of Nipigon Basin, Ont., 554*; Report on Traverse through Southern Part of N. W. Territories from Lac Seul to Cat Lake, 554*
- Wilson, D., *joint author*, see W. H. Stowell.
- Wilson, Dr. L. L. W. Climate and Man in Peru, 67*
- Wilson, E. Survey Methods and Costs for a Large Area, 222*
- Wilson, Hon. James. Protecting our Forests from Fire, 394*
- Wilson, M. E. Northwestern Quebec, etc., 949*
- Wilson, W. B. From the Hudson to the Ohio, 720*
- Wilson, W. J. Geologic Reconnaissance along the Transcontinental R.R. in W. Quebec, 949*
- Wilverth, Capt. Pêche et Poisson au Congo Belge, 716*
- Winchell, A. N. Graphite near Dillon, Mont., 867*
- Winchell, N. H. Hennepin at the Falls of St. Anthony, 714*
- Winds: ¶ Föhn Wind at Innsbruck, 621; Movement of Soil Material by the Wind. E. E. Free, 953*; Passatwinde des Atlantischen Ozeans. Dr. Mey, 640*; On Relation between Atmospheric Pressure and Wind. J. W. Sandström, 872*; Die Winde in Deutschland. Dr. K. Knoch, 793*; Wind and Wetter. Prof. Dr. L. Weber, *rev.*, 787
- Winegar, B. Logging Operations in Province of Quebec, 152*
- Winnipeg, From — to the Arctic Ocean. A. D. Cameron, 715*
- Winter, N. O. Argentina and her People of To-day, *rev.*, 625; Brazil and Her People of To-Day, *rev.*, 63
- Wireless Telegraphy, Transatlantic. Comm. G. Marconi, 640*
- Wisconsin: ¶ Chattanooga Campaign, With especial reference to Wisconsin's participation therein. M. H. Fitch, 880*; Frost and Temperature Conditions in Cranberry Marshes of H. J. Cox, 635*; Fur Trade in — 1815-17, 475*; Lead and Zinc District. C. M. Sanford, 474*; Prehistoric Earthworks in. A. B. Stout, 222*; Results of Spirit Levelling in Michigan and — 1897-1909. R. B. Marshall, 789*; — Women in the War between the States. E. A. Hurn, 880* ¶ Maps of Wisconsin: Fond du Lac Quadr., Neenah Quadr., 308*; Waterloo Quad., 75*; Winnebago Special Map, 389*
- Wisconsin R. Drainage Basin. R. Follansbee, A. H. Horton and R. H. Bolster, 948*; Lumber Rafting on. S. A. Sherman, 714*
- Witte, Baron J. de. Au Montenegro et en Albanie, 315*
- Witwatersrand, Geol. Map of portion of Lower — System on Central Rand, 956*
- Witzenhausen, Deutsche Kolonialschule in. Dr. M. G. Schmidt, 952*
- Wohlrahe, W. Wasserkräfte Frankreichs, 71*
- Wolf, F. W. De. State Geological Survey of Illinois, 916
- Wolkenhauer, W. Aus der Geschichte der Kartographie, 399*
- Wood-Jones, F. Coral and Atolls. Their History, Description, etc., *rev.*, 944
- Woodruff, E. G. Coal Field in S. E. Part of Bighorn Basin, Wyo., 152*; Lander Oil Field, Wyo., 948*; Map of Lander Oil Field, 706*; see also M. R. Campbell, *joint author*.
- Woodward, H. P. Geology and Ore Deposits of West Pilbara Gold Field, 638*
- Woolley, C. L., and D. Randall-MacIver. Karanòg. The Romano-Nubian Cemetery, *n.*, 388
- Worcester, J. E. Modern Atlas to accompany Elements of Geography, Ancient and Modern (1819?), 800*
- Worcester, Mass., Geography of. R. M. Brown, 366
- Workman, W. H. Call of the Snowy Hispar, *rev.*, 929; Tongue of the Hasanabad Glacier in 1908, 225*
- World: ¶ Bevölkerung der Erde und ihre Verteilung nach dem Geschlecht. S. Gulischambarow, 559*; Commerce of the World in 1910, 860; Cosmos:

- Sketch of Physical Description of the Universe. A. von Humboldt, 320*;
Geographical and Historical View of the World . . . With Notes . . . by Jedidiah Morse. J. Bigland, 239*;
Habitable World Described . . . Including all the new Discoveries, etc., 1787-92. J. Trusler, 240*;
International Map of, 317*;
Nations of the Modern World. H. J. Mackinder, *n.*, 543;
Vagabond Journey Around the. H. A. Franck, *rev.*, 216;
Voyages to Various Parts of the World, and Remarks on Different Countries, etc. J. Willock, 240*
¶ Maps of World: Erdkarte der Ausbreitung der Pest am Ende des 19 u. Anfang des 20 Jahrhunderts. Dr. R. Pöch, *n.*, 473;
Goode's Base Map, *n.*, 712;
Isogonenkarte in besonderer Projektion. Dr. H. Maurer, *n.*, 799;
Kautschuk-Weltkarte 1911, *n.*, 473;
Map to show Azimuth and Distance from Tokyo, *n.*, 879;
Gegen-azimutale winkeltreue Projektion. Prof. H. Maurer, *n.*, 552;
Portion of Land Hemisphere showing Paleozoic land connections and paths of marine faunal migrations, 959*;
Present distribution of genera *Acraea*, *Melanitis*, *Mycalis* . . . in relation to late Paleozoic or Early Mesozoic Continent, 959*;
Present Distribution of *Terias Catopsilia* and *Ampullaria* and of *Testacellidae* in relation to Equatorial Mesozoic Continent, 959*;
Weltkarte der Erzlagertstätten. J.W.H. Adam, *n.*, 80;
World's Telegraphic System, 1911, 959*;
Three Charts representing: (1) Annual average isobars, isotherms of air, cold ocean currents, etc.; (2) Normal Wind Directions and Velocities for Jan. and Feb.; (3) — for July and Aug., 706*
Worlds, Evolution of. P. Lowell, *n.*, 388
Wright, F. E. Some Effects of Glacial Action in Iceland, 478*
Wright, I. A. Cuba, *rev.*, 533;
Nipe Bay Country-Cuba, 949*
Wunder, L. Beobachtungen am Langjökull und im Thorisdalur auf Island, 226*
Wyoming: ¶ Buffalo Coal Field. H. S. Gale and C. H. Wegemann, 313*;
Coal Field in S. E. Part of Big Horn Basin. E. G. Woodruff, 152*;
Eastern Part of Little Snake R. Coal Field. M. W. Ball and E. Stebinger, 474*;
Lander Oil Field. E. G. Woodruff, 948*;
Mineral Resources of — and Mining Laws of the State, etc. C. E. Jamison, 880*;
Physiography of Bishop Conglomerate in Southwestern. J. L. Rich, 66*;
133;
Powder River Coal Field. R. W. Stone and C. T. Lupton, 151*;
Salt Creek Oil Field. C. H. Wegemann, 948*;
Southern Part of Rock Springs Coal Field. A. R. Schultz, 151*;
Weathering of Coal in Arid Region of Green River Basin. A. R. Schultz, 151*
¶ Maps of Wyoming: Geologic Map of Sublett Mts., 229*;
Lander Oil Field, with sections. E. G. Woodruff, 706*;
Map showing Extent of Phosphate Reserve of, 229*;
Prel. Geol. Map and Structure Section of Cokeville Area, 229*;
Rock Springs Quad., 75*;
Salt Creek Oil Field. C. H. Wegemann, 706*;
Sheridan Quad., 874*
Y.
Yadkin or Pedee R. Drainage Basin, 475*
Yalong (Chine), Dans les rapides du. Mgr. de Guébriant, 70*
Yama Bay, Sea of Okhotsk, Chart, 799*
Yamamoto, K. Guide to the Celebrated Places in Kiyoto and the Surrounding Places for Foreign Visitors, 560*
Yangtse River (Yangtse-kiang): Beitrag zur Kenntnis der Fische des Jangtze und seiner Zuflüsse. Dr. Kreyenberg, 70*;
Yangtse-kiang as Weltverkehrsstrasse. Dr. G. Wegener, 870*
Yap, The Peopling of. W. Churchill, 510
Yate, Lieut. Col. A. C. The proposed Trans-Persian Railway, 717*
Year Books: ¶ Geographisches Jahrbuch, 1910, *n.*, 705;
Jahrbuch der Königlich Preuss. Geol. Landesanstalt zu Berlin, 1907-8, 558*;
1910, 793*;
Jahrbuch des Schweizer Alpenclub, 1910-11, 880*;
New International Year Book. Compendium of World's Progress for 1910. Edited by F. M. Colby, 560*;
New Zealand Official Year-Book, 1910, 792*;
Statesman's Year Book for 1911. Ed. J. S. Keltie, 640*;
Stat. Jahrbuch für das Grossherzogthum Baden, 1910-11, 800*;
Year-book of Australia for 1911, 800*
Yeld, G. Scrambles in the Eastern Graians, 320*
Yellowstone National Park, Origin of Thermal Waters in. Dr. A. Hague, 553*
Yenchi District, Map of Western, 877*
Yenisei, Obi and — Gulfs. Chart

- compiled from surveys 1828-1909, 799*
- Yerba-Maté. Paraguayan Tea. A. Hale, 639*
- Yeu, L'Île d'— à travers les âges d'après la géologie, la cartographie et l'histoire. A. Pawlowski, 718*
- Yoe, S. The Burman, His Life and Notions, *rev.*, 305
- Yola-Cross River Boundary Commission, Southern Nigeria. Maj. G. F. A. Whitlock, 396*
- Yoruba, Nigerian Studies; or, The Religious and Political Systems of the —. R. E. Bennett, *rev.*, 460
- Yosemite: ¶Excursion to the —, or, Studies in the Formation of Alpine Cirques, "Steps," and Valley "Treads." E. C. Andrews, 553*; Hanging Valleys of the —. D. W. Johnson, 826, 890; Yosemite Trails. J. S. Chase, *rev.*, 923; Yosemite Valley: Its History, Characteristic Features, and Theories Regarding its Origin. G. Clark, *rev.*, 61
- Yosemite National Park, Administrative Map of. (U. S. Geol. Surv.) R. B. Marshall and A. H. Sylvester, *n.*, 77
- Young, G. A. Tobique District, N. B., 949*
- Young, R. E. Prince Edward Island, Nova Scotia and New Brunswick (Map), 78*; Western Canada (Map), *n.*, 77; Map of Ontario, Gowganda sheet, 77*
- Young, T. M. American Cotton Industry, 319*
- Younghusband, Sir Francis. The Cloud in Tibet. British Action and Its Results, 156*
- Yucatan: ¶Informe acerca de una excursion geol. prel. efectuada en el Estado de —. J. Engerrand and F. Urbina, 868*; Trip to Chichen-Itza, 868* ¶Map: Croquis Anexo al Informe acerca de una Exploración en el Estado de Yucatan, 634*
- Yukon-Tanana Region, Water Supply 1909. C. E. Ellsworth, 635*
- Yukon Territory: ¶Preliminary Memoir on Lewes and Nordenskiöld Rivers Coal District. D. D. Cairnes, 475* ¶Maps: Braeburn-Kynocks and Tantalus Coal Areas, 230*; Map of Boundary between British Columbia and — from Tatschenshini R. to Teslin Lake, *n.*, 231
- Yunnan: ¶Across Yunnan. A. Little, *rev.*, 210; Chemin de fer du. J. Rodes, 792*; Provincia dello Junnan. D. A. Mazzolani, 637*
- Z.
- Zacatecas, Granodiorita de Concepción del Oro en el Estado de — y sus Formaciones de Contacto. Dr. A. Bergeat, 475*
- Zagorodsky, Dr. M. Banane und ihre Verwertung als Futtermittel, 952*
- Zahmen Kaiser, Plateau des (Map), 878*
- Zambezi, Falls of the. Wonders of the Mosi-Oa-Tunga. L. L. Seaman, 951*
- Zeeland, Zur Geschichte und Natur der Schelde-Mündungen in der Niederländischen Provinz —. F. Müller, 952*
- Zeitschrift des Deutschen und Österreichischen Alpenvereins, Jahrgang 1910, 560*
- Zeller, Dr. R. Forschungsreise von Dr. W. Volz in das Hinterland von Liberia, 154*
- Zemplin, Hungary. Map: Geol. Skizze des Zempléner Klippengebirges, 958*
- Zibans, Oasis des. A. de Claparède, 315*
- Zimbabwe, Mystery of. F. A. Edwards, 951*
- Zimmermann, E. Deutsche Tanganjika-Njassa-Gebiet, 68*; Das heutige Katanga, 68*; Mines de cuivre du Katanga, 153*; Wirtschaftliche Entwicklung des südwestlichen Deutsch-Ostafrika, 315*
- Zimmermann, M. Antarctic Land of Victoria. From Voyage of "Discovery," 478*; Le Sahara Soudanais, 717*
- Zinder, Junction du territoire de. Lieut. Detchebarne, 69*
- Ziz, Notes sur le Haut —. M. Oustry, 476*
- Zoëga, G. T. Concise Dictionary of Old Icelandic, *n.*, 213
- Zoogeography. See under Geography.
- Zugmayer, Dr. E. Afghanische Bahnprojekt, 155*
- Zuider Zee. Wat de Afsluiting en Droogmaking der Zuiderzee Eigenlijk Beteekent. A. A. Beekman, 639*
- ¶Map: Zuiderzee en haar Afwateringsgebied in Nederland, 234*
- Zwemer, Rev. S. M. Notes on Oman, 396*

ILLUSTRATIONS.

AMERICAN GEOGRAPHICAL SOCIETY

The New Home of the American Geographical Society: ¶ Broadway and 156th Street Fronts, facing p. 488; Broadway Front, facing p. 484; Editorial and Library Staff, 483; Drafting Room, 487; Main Hall, facing p. 486; Map Floor, 485; Office Floor, 482; South Front of the Building, facing p. 481; Stack Room, facing p. 486

AMERICA

California, Coast Ranges of —, Extension of the Known Area of Pleistocene Glaciation to the: ¶ Snow Mountain, Main Ridge about one-half mile southeast of —, Flat top, 167; Model of Snow Mountain, showing glaciated Valleys, 163; Striae found on bed rock in glaciated valley of —, 165; Well-preserved Rhoches-Mountonnées in Valley F., Snow Mt., 166

Canadian Northwest, Exploring the: ¶ Green Lake Settlement, 186; Lac la Plonge, Banner oats at English Mission, 187; — Potatoes at English Mission, 189; — Sawmill at R. C. Mission, 187; Mt. Nebo, near Green Lake Trail, Farm at, 186; Stanley, Churchill River, Preston Wheat Field, 188

Hempstead Plains. Natural Prairie on Long Island: ¶ East Meadow Brook, Looking up slough at western edge of valley of, 357; — Looking up the valley of, 356; Hempstead Brook, Looking east across dry valley at — east of Garden City, 352; Hempstead Plains, Looking W. N. W. in dry valley near southeastern corner of, 353; Grove of Pitch Pine, Edge of small — in prairies about a mile southwest of Central Park, 359

Potosí: ¶ Cerro, Slopes of — Potosí in the Distance, 3; Market Place from the Roof of the Mint, 6; Potosí, Just outside of, 10; Llamas in the streets of, 11; Potosí Tin in Ingots, 8; View from the Prefect's Window in — showing both the old and the new Plaza, the Cathedral and the theatre, 4

Prince William Sound and the Southern Part of Kenai Peninsula, Alaska, Glaciers of: ¶ Kenai Peninsula, Glaciers of the Southern Coast of: Aialik Glacier, North side of front of, 731; Bear Glacier, East side of, 727; Ellsworth Glacier, July, 1909, 725; Holgate Glacier, Front of the,

731; McCarty Glacier, Central part of front of, 736; Northwestern Glacier, Eastern part of front of, 733; Northwestern Glacier, General View of, 734; Pedersen Glacier, North side front of, 731; Puget Glacier, July, 1911, 733; Thumb Cove, Resurrection Bay, Glaciers east of, 726 ¶ Prince William Sound. Glaciers of Port Wells: Baker and Detacht Glaciers, June, 1909, 333; Barry Glacier, Western side of trough, June, 1909, 331; Bryn Mawr Glacier, Aug., 1905, 329; Harriman Glacier, June, 1909, 336; Harvard Glacier, Western part of front — showing its southernmost feeder, 328; Serpentine Glacier, June, 1909, 332; Surprise Glacier, June, 1909, 335; Toboggan Glacier, Aug., 1905, 337; Yale Glacier, East side of, July, 1909, 326; West side of front — July, 1909, 327 ¶ Prince William Sound, Glaciers of West Coast of: Bainbridge Glacier, Extreme north side of, 415; Front of, 414; Southern part of front, 416*; Blackstone Glacier, One of eastern ice lobes, 403; Central tide-water part of, 405; Western tide-water part of front of, 404; Chenega and Princeton Glaciers, 411; Moraine, Detail of the small, 409; Nellie Juan Glacier, Front of, 407; Nellie Juan Glacier, Bare Zone recently occupied by ice, small moraine and forest, untouched by last recorded advance of, 408; Tiger Glacier, 412

Superior Lake Region, Progressive Development of Resources of: ¶ Lake of the Woods on International Boundary, 662; Nipigon, Canada, Lake near, 564; St. Louis River, looking North, near Thompson, 666; Soo, The Rapids at the, 567

United States, Rice in the: ¶ Arkansas, Breaking ground for Rice in — along the "Cotton Belt Route," 502; Rice Mill at Stuttgart, Ark., Interior of, 508; Sacking Rice in Field, 507; Stuttgart, Ark., Rice Field Farm of S. H. Taggart, 506; Sunset Route, Harvesting Rice, 505; Waldenburg, Ark., Rice Field at, 503

Yosemite, Hanging Valleys of the: Yosemite Valley looking east, 836

Valley, A Small Hanging, 449

ASIA

Asia Minor, The Karst Country of Southern: ¶ Adalia, Wooded mountains near, 104; Bey Shehir Lake, 83;

Russian Village in, 98; Charshehbeh, The gorge of — showing dense vegetation, 99; Kara Baulo, in the forested area near Adalia, Turkish peasants among the seats of Council Chamber, 103; Phrygia, Fantastic cliffs of volcanic tuff in, 92; A Greek tomb in —, carved originally to simulate a portico with columns, 96; Sink-hole in the limestone country where the water disappears underground, 97; Spring where Appollo flayed Marsyas, 101

Chehkiang, China, Northeastern —: Notes on Human Adaptation to Environment: ¶ Bridge showing Span composed of Long Slabs of Stone. Si-hu, or West Lake in the background, 812; Chinese Junk showing Sticks of Bamboo used to flatten the sail, 820; Duck-herd with Ducks, 809; House made of Bamboo Matting, 821; Water Buffalo, Ploughing with, 815

Teal Volcano, Luzon, Eruption of: ¶ Bañadero, Eruption Cloud as it Appeared from — Jan. 30, 1911, 908; Lemery, Fissure in town of, 911

EUROPE

Iceland, Physiographical Features of: "Balder's Bra, *Bellis perennis*, dense

mass near the Shore of a Fiord, 497; Grimstungaheithi, Characteristic Moraine, 493; Hvítá, Water Flowing out of the Lava into the Canyon of the, 499; Krafla, General View of a Portion of Solfatara near the Base of, 496; Oxnadalr Pass, Midsummer in the. Typical Farm, 491; Mývatn, showing Crater Islands with Krafla in the Center, 492; Reykholt, Geyser in the Center of Glacial Stream near, 495

Land Reliefs that are True to Nature:

¶ Matterhorn, Naturalistic Model of the, 420

OCEANIA

Land Reliefs that are True to Nature: Bora Bora Model, Photographs of central portion, 422

POLAR REGIONS

Antarctic Explorations, Charcot's:

¶ Alexander I Land, 85; Pushing into the Floe Ice off, 83; Alexander Land as seen from the North, 89

Jan Mayen Expedition of 1911: Driftwood Bay, Entrance to, 883; Iceland, Sunlight through the rifted fog lying low off the east of, 887; Jan Mayen Coast, General Character of, 884; Traill Cape, 886

MAPS, DIAGRAMS, AND PROFILES

AMERICA

American Slavery, Geographic Influences in: ¶ Coastal Plain, Section across the — from the Piedmont to the Gulf in Central Alabama, 172; Cotton Belt, Map showing principal Divisions of — east of the Mississippi in Alabama and Mississippi, 171; Graphs showing Data from the Belt shown in Fig. 18, 174; Greenville, Tenn., Eastern Part of Ridge Belt, Profile showing Section near, 15; Louisiana, Map showing production of sugar in, 1860, 177; Map, 14; Maps to show Average Temperatures, 18, 19, 20, 21, 22, 23; Maps to show Number of Slaves in Thousands, facing p. 180; Mississippi Lowlands, Sketch Map of the, 175; Mississippi Lowlands and Loess Bluffs, Soil Map and Profile of a portion of, 176, Soil section and slavery factors on the, 178; Nashville Basin, Profile, Section and Graphs of southern part of, 16; North Carolina, the Coast of, 25; Number of Slaves in Thousands, 113;

Percentage of Slaves to Whites, Diagram, 107; Sea Island Coast of South Carolina and Georgia, Map, 110; Sea Islands and their characteristic soils near Charleston, S. C., 111; South Carolina and Georgia, Principal Regions of, 112; Tennessee Valley in Alabama, Section across the, 173; Texas, Cotton production, 1900, and main soil belts of, 180; Tobacco South, Map showing distribution of the principal crops of the — in 1840, 108; Virginia and West Virginia, Generalized Profile and Section across, 109

Cleveland Normal School, Geographical Department of, 454

Michigan, Establishment of Boundaries: ¶ Erie and Michigan Lakes, Relative position of, 341; Michigan and Wisconsin, Supposed boundary between — 1838, 346; Michigan and Wisconsin, Boundary between —, as corrected by Capt. T. J. Cram, 1842, 349; Mitchell's Map of —, 1755, 341; Territory over which the jurisdiction

of Michigan extended — 1805, 1818, 1834, 340
 New York, Railroad Distances in: ¶ New York, Railroads of, 28; Distance from R. R. Station, 29
 North America, Pleistocene Glaciation of: ¶ Continental Glaciers, Map to show the position of the existing — which develop the excentric wind poles above the earth's surface, 649; — of Greenland and Antarctica, Profiles across the margins of the, 651; — of Pleistocene time, Map to show the position of — and the wind poles of the earth for the same time, 656; Diagram to show different layers of the lower atmosphere as determined by international observations with the use of sounding balloons, 648; Glacial Anticyclone, Diagram to show the position of — above a continental glacier, 647; Greenland continental glacier, Profile in natural scale of the, 643; Ice-cap in Iceland, Shield-like profile of, 645; Sand dunes formed by winds of Pleistocene time, Map to show Orientation and distribution of, 657
 Prince William Sound and the Southern Part of Kenai Peninsula, Glaciers of: ¶ Kenai Peninsula: Aialik Bay, Map of upper part of, 729; Bear Glacier, Map of front of —, 727; Ellsworth Glacier, Map of, 724; Harris Bay and Northwestern Glacier, Sketch map of, 732; Kenai Peninsula, Map of southern part of — showing coastal glaciers, 722; McCarty Glacier, Map of front of, 735; Puget Glacier, Map of, 723; Thumb Cove, Resurrection Bay, Sketch Map of glaciers east of, 726 ¶ Prince William Sound: Map of northwestern part of, July, 1909, 322; Bainbridge Glacier, Map of the front of, 413; Blackstone Bay, Map of, 402; College Fjord, Map of — July, 1909, 323; Harriman Fjord, Map of the upper part of —, June, 1909, 330; Ice Bay, Map of, 410; Port Nellie Juan, Map of, 406
 São Paulo, Economic Climatology of the Coffee District of: ¶ Map of the Coffee District in, 429
 Superior Lake Region, Progressive Development of Resources in the: ¶ Great Lakes, Movement of Coal on, 570; Great Lakes, Movement of Grain and Flour on, 566; Great Lakes, Movement of Iron Ore on, 565; Map to show decrease in lumber shipments, 1897-1907, 660; Soo, The

Rapids, Canals and Locks at, 568; Superior Lake, Sketch Map of — Region showing Iron Districts and Lines of Transportation, 563
 United States, Rice in the: ¶ Map of Rice Cultivation in the, 1910, 501
 Yosemite, Hanging Valleys of: ¶ Illilouette Falls. Showing notch due to weathering along joint planes, 901; Sketch Map showing Relation of the Yosemite and other Similar Valleys to Their Glacial Drainage Basins, 892; Profile, 828; Vernal and Nevada Falls, 902; Yosemite Falls, 900

ASIA

Chekkiang, Northeastern: Notes on Human Adaptation to Environment, Map of northeastern Chekkiang, 802
 Taal Volcano, Eruption of: ¶ Map of Part of Southwestern Luzon showing Area Covered by Mud from the Eruption, 905

EUROPE

Iceland, Physiographical Features of: Map Illustrating Mr. Russell's routes in, 490

POLAR REGIONS

Antarctic Explorations, Charcot's: Carte provisoire de l'Antarctique Sud-Américaine, facing p. 81
 Jan Mayen Expedition of 1911: Map of — based on the map of Austrian Expedition of 1882-83, 882

GENERAL

Land Forms, Notes on the Description of. Profiles, 852, 853
 Nations, The Culture of: ¶ American Countries, Comparative Diagram of Indices of — for schooling, commerce, railroads and mails, 261; Commerce, Showing Total General Commerce per Capita, 251; Culture, Indices for Schooling, Railroads, Commerce, etc., 245; European Countries, Comparative Diagram of Indices of — for schooling, commerce, railroads and mails, 243; Inhabited World, 1905, 244; Mails, Shows Number of Pieces of Mail delivered annually per capita, 255; Railroads, Shows Number of Miles of Railroad per 100 square Miles, etc., 254; Schooling, Percentage of Population at elementary Schools, 250

PORTRAIT

Palmer, Nathaniel B., facing p. 282

